International Institute for Environment and Development

Sustainable Agriculture and Rural Livelihoods Programme

Gatekeeper Series no. 104

Marketing Forest Environmental Services – Who Benefits?

Natasha Landell-Mills

2002

The Gatekeeper Series *produced by IIED's Sustainable Agriculture and Rural Livelihoods Programme aims to highlight key topics in the field of sustainable agriculture and resource management. Each paper reviews a selected issue of contemporary importance and draws preliminary conclusions for development that are particularly relevant for policymakers, researchers and planners. References are provided to important sources and background material. The Series is published three times a year – in April, August and December – and is supported by the Swedish International Development Cooperation Agency (Sida).*

The views expressed in this paper are those of the author(s), and do not necessarily represent those of the International Institute for Environment and Development (IIED), The Swedish International Development Cooperation Agency (Sida), or any of their partners.

Natasha Landell-Mills is a Research Associate at the International Institute for Environment and Development (IIED), London. She has been heavily involved in IIED's Forestry and Land Use Programme's Instruments for Private Sector Forestry project, including the completion of a global review of private sector participation in sustainable forestry, a country study in China and a review of financing mechanisms for sustainable forestry in Malawi. She can be contacted at IIED, 3 Endsleigh St, London WC1H 0DD. Tel: +44 (0)207 388 2117; Fax: +44 (0)207 388 2826; email: natasha.landell-mills@iied.org

2002

Executive Summary

Market-based approaches to environmental management are all the rage. Claims that market mechanisms can encourage environmental protection and promote greater economic efficiency, whilst saving tax payers money, are tantalising. In the forestry sector, policy-makers are widely heeding this advice and shrinking command and control systems in favour of incentive mechanisms that seek to align private enthusiasm with the public good. In some cases, governments are even promoting the creation of markets where none existed before. In others, markets are evolving of their own accord.

In such times of change, it is difficult to stand back and take stock. Yet, it is during such times that guidance is most needed. Unanswered questions abound. What drives market development? How should markets be established? What costs are involved? Will markets improve welfare? Will some stakeholders benefit more than others? How does performance vary between market structures? What is the role for governments? In the rush to introduce market-based solutions to environmental problems, a particular concern is how such markets are affecting poorer groups.

This paper attempts to shed light on these questions. It is based on a global review of emerging markets for carbon sequestration, biodiversity conservation, watershed protection and landscape beauty. In total, 287 cases were reviewed from a range of developed and developing countries. While emphasising the enormous diversity of experiences throughout the world, the paper also draws out cross-cutting lessons relating to market form, drivers, processes and impacts. The author calls for both optimism and caution, with special attention given to potential pitfalls as well as opportunities facing poorer groups.

The impacts of markets on marginalised people is of concern not just for ethical reasons, but because markets that exclude major land users risk being both inefficient and unsustainable. The paper ends with four major recommendations for policy-makers interested in promoting equitable markets, including:

1. *Clarify and assign environmental service property rights*. Secure property rights are key if land managers are to be able to sell their services.

2. *Strengthen capacity for market participation*. Training in marketing, negotiation, management, financial accounting, contract formulation and conflict resolution are important. Technical skills relating to forest management for environmental services will also be needed.

3. *Market support centre*. To improve poor people's ability to participate in emerging markets, a market support centre could offer access to information on recent prices and transactions, a contact point for potential buyers, sellers and intermediaries, an advice bureau and practical research which draws together emerging best-practice.

4. *Access to finance*. Finance is frequently needed to negotiate and conclude environmental service deals. Where the financial sector is underdeveloped, and the environmental service sector faces significant hurdles in accessing funds, the government may have a key role to play in promoting improved access.

Policy-makers and practitioners seeking to address environmental and social problems in the forestry sector through market instruments would do well to consider the insights offered by this review.

MARKETING FOREST ENVIRONMENTAL SERVICES – WHO BENEFITS?[1]

Natasha Landell-Mills

In 1988, Applied Energy Services, Inc., a United States electrical power producer, invested US$2 million in a number of agroforestry projects in Guatemala to absorb the carbon dioxide emitted from a new 183 megawatt coal-fired power plant in Connecticut. In 1999, the Botanical Garden Trading Company decided to set aside 2.5% of its annual turnover for biodiversity hotspot conservation. In the Langtang National Park of Nepal, frightened that rapid deforestation and degradation will undermine tourist interest, lodge operators in Syabrubensi village have agreed to pass on payments to local communities to protect over 170,000 hectares, including some of the best preserved silver fir and rhododendron forests in the country.

Hardly a week goes by without new stories, like those above, of innovative deals involving payments for a range of forest environmental services, such as carbon sequestration, biodiversity conservation, watershed protection and landscape values. Each new tale adds to the growing evidence of rapidly evolving environmental service markets. But they also raise many questions. How common are payments for environmental services? What form do payment systems tend to take? How exactly do they evolve? What impacts do they have on human welfare? Of particular concern is our lack of knowledge of what such markets mean for poor people.

A recent review by the International Institute for Environment and Development (IIED) tries to shed light on market creation for different forest environmental services (Landell-Mills and Porras, 2002). The review examines over 250 examples of existing and proposed payments for environmental services from all over the globe. Drawing on insights from New Institutional Economics (see for instance Coase, 1937, 1960; North, 1990; Williamson, 1985; and Stiglitz, 1986), the paper considers six central questions for four types of forest environmental service:

1. What form do these markets take?
2. Why do these markets evolve?
3. How do these markets evolve?
4. What does market development mean for human welfare?
5. What do markets mean for poor people?
6. What are the key constraints to market development?

1 This paper draws on a global review of markets for forest environmental services and their impacts on the poor undertaken by IIED between February 2000 and July 2001 (Landell-Mills and Porras, 2002). Support for this research was provided by the UK Department for International Development, the European Commission, the Danish Ministry of Foreign Affairs, and Swiss Development Cooperation. The opinions expressed here are those of the author and do not represent the views of the sponsoring agencies.

In this paper we discuss some emerging answers to these questions. First we briefly describe the four markets considered in the IIED review.

Markets for biodiversity conservation

If current trends continue, it is estimated that 24% of mammal species and 12% of bird species face a "*high risk of extinction in the near future*" (FAO, 2001). It is widely accepted that the primary cause of extinction is habitat loss. Tropical deforestation is of particular concern, expected to be responsible for the loss of an estimated 5-15% of the world's species between 1990 and 2020 (Reid and Miller, 1989).

The loss of biodiversity is of great concern the world over, and the loss of tropical forest biodiversity has been singled out for urgent attention. Calls for action to stem the loss do not only come from conservationists; representatives of poor rural communities are also raising their voices to protect the biodiversity on which vulnerable groups so often depend. Biodiversity is not simply valued for the range of species it embodies, but because of its many services to human beings, at the local, national and global level.

Whilst often crucially important to welfare, biodiversity is often not valued directly by the market. Like many other environmental services, biodiversity is viewed by society as a 'free' good. Attempts to force consumers to pay for biodiversity have traditionally been frustrated by the costs of excluding non-payers. The lack of finance for biodiversity protection has spurred a search for innovative solutions. The promotion of markets for forest biodiversity protection services is perhaps the most ambitious to date.

However, the process of commercialising the diversity of nature is not easy. This is immediately clear from IIED's review of 72 emerging payment schemes.

Not only are the services provided by biodiversity numerous, but most are hard to measure, which makes them difficult to package for sale. Moreover, services are rarely consumed by a clearly identifiable clientele who can be approached for payment. It is also often difficult to determine who 'owns' them, and therefore who is in a position to 'sell'. All too often the chief beneficiary of biodiversity protection is identified as 'the global community' – not an easy target for marketing. Threshold effects in the supply of biodiversity, which mean that forest areas below a certain size will fail to deliver the demanded biodiversity, make it even more difficult to portion out the services to buyers. A minimum contiguous area may need to be protected, not individual hectares.

In spite of these problems, growing public awareness of biodiversity benefits and threats of loss are driving governments, international non-governmental organisations (NGOs) and private companies to start paying for forest biodiversity conservation. The growth and diversification in market participation has produced significant innovation in the design of commodities used to sell biodiversity (Box 1). Payment mechanisms also vary considerably, ranging from site-specific and complex deals involving payments that are

embedded in larger projects, eg. integrated conservation and development projects, to transactions that channel funds via an intermediary, such as a trust fund. Other emerging payment mechanisms include pooled investment funds that permit buyers of services (ie. investors) to pool their resources, and transactions that are tied to retail sales (eg. biodiversity-friendly coffee). In its own way, each mechanism seeks to cut market risks, overcome threshold effects and to minimise transaction costs. As risks and costs come down, participation is likely to rise.

Box 1: Selling biodiversity protection – a few examples

Exclusive access rights to Western Australia's Smokebush
In the late 1980s AMRAD, an Australian pharmaceutical company, sought exclusive access rights to Western Australia's Smokebush to develop potential medicinal uses. Following negotiations with the state Department of Conservation and Land Management, access rights were awarded in return for a number of 'payments' by the company. US$730,000 was paid up front, a share of any future royalties was promised and $320,000 was provided for further research by a consortium of 26 Western Australian scientists. These payments were allocated to conservation projects, the protection of endangered and rare species, and to a range of related activities, including information technology and research.

Conservation coffee
Conservation coffee is grown by intercropping coffee plants with trees. The technique is thought to raise soil fertility and reduce the need for fertilisers in coffee production. It also has valuable spin-offs for biodiversity. By marketing Conservation Coffee or Shade Coffee from threatened biodiversity hotspots (eg. in Latin America and West Africa), international NGOs such as Conservation International and The Nature Conservancy have sought to capture the general public's willingness to pay for biodiversity protection.

Conservation concession, Guyana
In 2000, the Government of Guyana finalised an exploratory permit with Conservation International for a conservation concession in 200,000 acres of forest. The idea is simple. Rather than leasing out concessions to timber producers, the government will lease out a concession for conservation. During the exploratory permit phase, Conservation International is paying $0.15/acre/year, plus a $20,000 upfront application charge. Where a full concession is awarded charges would be revised.

Markets for carbon sequestration

Today there is a strengthening scientific consensus that global warming, resulting from a build up of greenhouse gases in the atmosphere, is a real and potentially dangerous phenomenon. The Inter-governmental Panel on Climate Change, an international group of leading climate scientists, predicts that at present rates, temperatures will increase by 1.4 – 5.8 degrees Celsius over the next 100 years, with potentially serious implications for humans (IPCC, 2001). By far the largest contributor is fossil fuel burning, followed by forest degradation and deforestation.

Fear of these impacts has spurred international action. In 1992 the United Nations signed a Framework Convention on Climate Change (UNFCCC). In 1997 the signatories to the UNFCCC sought to establish explicit and mandatory limits on industrialised and transitional nations' (Annex 1 countries') emissions with the signing of the Kyoto Protocol. The Protocol sets specific targets for individual countries and provides a framework for trading emission rights. It also allows countries to trade emission rights to reduce their costs. For countries wishing to emit more than their limit, they must purchase additional rights from those who find it less costly to reduce their emissions.

The Kyoto Protocol sets out three potential "*flexibility mechanisms*" that would permit emission rights trading:

- International Emission Trading mechanism that allows Annex 1 countries to trade emission permits, known as Assigned Amount Units;

- Joint Implementation mechanism that allows countries to earn Emission Reduction Units through projects in other Annex 1 countries; and

- Clean Development Mechanism allowing for the generation of Certified Emission Reductions from projects in non-Annex 1 countries (ie. developing countries).

According to the Protocol, emission reductions may be achieved in one of two ways: (1) by reducing emissions; and (2) by increasing carbon sequestration and storage. Where greenhouse gas emission reduction, sequestration or storage is achieved offsite, it is often referred to as a greenhouse gas or carbon offset.

Forests are an important source of carbon (about one-quarter of estimated global emissions come from burning forests, land clearance, and soil erosion) as well as a carbon store (forests account for two-thirds of terrestrial carbon). This means they can play a key role in generating carbon offsets: reforestation / afforestation will increase carbon sequestration; improved forest management can increase sequestration and reduce emissions; conservation and protection against deforestation will cut emissions; and substitution of sustainably produced biomass for fossil fuels will cut emissions.

The Kyoto Protocol has set the stage for a market in carbon offsets. Even before details of the Protocol were finalised in November 2001, the carbon offset market was evolving quickly. Not only are many national governments passing laws to ensure emission targets are met, but greenhouse gas emitters, brokers, consultants, NGOs, communities and potential suppliers are responding directly to international policy processes (Box 2).

Box 2: Forest-based carbon offsets – a spreading phenomenon

State Forests New South Wales, Australia
Faced with declining profits from timber, increasing environmental controls and pressures to provide more amenity services to the general public, State Forests New South Wales has been at the forefront of efforts to market its forests' carbon. Its strategy has been to capitalise on large-scale emitters' interest in hedging future carbon risks by offering immediate sales of, as well as future options to purchase, certified and guaranteed carbon offsets. To make deals more attractive, State Forests offers buyers returns from timber sales from the plantations. To balance the returns to forests and carbon sequestration, forests are gradually built up so they incorporate several age classes. State Forests' only condition is that investors buy at least 1,000 hectares, ensuring transaction costs are covered. To date three trades have been completed. While all deals have been negotiated directly, State Forests is seeking to streamline the process by using specialised brokers and exchange-based trading.

Carbon offsets in Argentina
In 1999 the German government agreed to invest in a project to generate carbon offsets in La Plata/Fontana of Argentina. 120,000 ha of native forests in the area are estimated to store 12.6 million tonnes of carbon. Currently the area is threatened by fires, unsustainable logging, and conversion for pasture. Supply of carbon offsets will be generated through fire management, enrichment planting, sustainable forest management and afforestation. The projected offsets amount to 64-116 thousand tonnes CO^2 per year over 50 years.

But the process of market development for carbon offsets has not been smooth, nor is there a single unified trading platform where buyers and sellers can come together. The most sophisticated trading systems are being set up in industrialised countries as a result of concerted government efforts to introduce emission caps and establish clear rules and regulations to guide market development. However, most national schemes do not currently permit forest-based offsets, reflecting recent uncertainties in the Kyoto Protocol.[2] For the moment, the forest-based offset market continues to be dominated by voluntary ad hoc transactions aimed at gaining experience and generating favourable publicity. International trade in Joint Implementation and Clean Development Mechanism carbon offsets has been primarily generated through complex and individually negotiated projects. Nevertheless, following clarifications at the seventh Conference of Parties, prospects for forest-based offsets have improved. Where such offsets offer significant cost savings, the market will not wait long to expand their role.

2 Uncertainty over the permanence of forest-based carbon offsets (eg. due to the potential threat of fire) has led to demands for limits to be placed on their eligibility under an international system of carbon rights (see for instance Pew Centre for Global Climate Change, 2001). These restrictions were duly agreed in late 2001 at the seventh Conference of Parties to the UNFCCC, most notably limiting the use of the Clean Development Mechanism to afforestation and reforestation activities.

Markets for watershed protection

In a world where one-fifth of the population lacks access to safe and affordable drinking water and half the population lacks access to sanitation (Cosgrove and Rijsberman, 2000), improving our understanding of how markets for watershed protection may positively influence land managers' behaviour is critical.

Appropriately managed forests – either on their own or as part of broader multiple-use landscapes – are thought to produce a number of watershed services valued by society, eg. protecting water quality, regulating water flows, preventing floods, controlling soil salinisation and maintaining aquatic habitats. Yet, the question of how to ensure that land managers internalise the positive and negative impacts they have on water users has been insufficiently explored.

The basic idea of a watershed market is simple. Where land managers provide critical services to downstream water users they may be able to argue a case for compensation for the costs of changing their practices. If water users face serious consequences from poor land management, they may be willing to pay for better land management practices. By setting up a payment system that embodies downstream beneficiaries' demands for improved land management and compensates land managers, both upstream and downstream communities are likely to be better off.

While the real world is rarely so simple, payments are emerging in a variety of forms. IIED's review identified 61 efforts to establish markets for watershed services. Whereas, historically, the protection of critical watersheds has been the preserve of government, the review highlights how a wide range of local stakeholders from local communities through to private companies and individual landholders are getting involved in delivering and financing watershed protection (Box 3).

Most markets have emerged as a result of a growing willingness to pay amongst beneficiaries. This is often the result of improved understanding of the benefits provided by watersheds and the growing threats they are facing. In more developed countries, new government regulations for improved water quality have also been a major force behind investment.

Markets for landscape beauty

Landscape beauty is a critical ingredient in the market for ecotourism, yet payments for protecting landscape quality have been slow to develop. Not only have tour operators taken landscape beauty as a free input, but protected area managers have rarely sought to capture consumers' willingness to pay. This situation is unsustainable, and in many locations supplies are threatened as sites of great natural beauty are converted to more remunerative uses such as agriculture or livestock grazing. Efforts to establish a market for landscape beauty are long overdue.

Box 3: Paying for watershed services

Rahr Malting Company – paying for reduced land-based pollution
In 1998 the Rahr Malting Company was required by the Minnesota Pollution Control Agency to offset its planned increase in pollution from a new wastewater treatment plant on the Minnesota River. Pollution reduction credits can be earned for reductions in nitrogen, phosphorus and sediment load. In addition to reducing emissions from point sources, eg. the wastewater treatment plant itself, reductions can be achieved through approved land management activities implemented by local farmers in the Minnesota River Basin. Activities include planting vegetative buffer strips along streams, livestock exclusion, tree planting in critical flood plain areas and wetland treatment systems. Rahr Malting will channel finance to land managers through a new Trust Fund overseen by a multi-stakeholder Board of Directors consisting of representatives of concerned citizens, state officials and company representatives. In total Rahr has paid US $250,000 for pollution credits.

Valle del Cauca, Colombia
Rio Cauca catchment lies between the central and western Andean ranges in Colombia. Threatened by growing water scarcity, a group of local rice farmers in the catchment came together to tackle declining land management upstream. They formed the Guabas River Water User Association (Asoguabas), which aimed to ensure continued watershed services by, initially, purchasing land in upper watershed areas identified as vulnerable to erosion. More recently, the Association has negotiated payments with upstream landowners. Funds for paying for the service are raised through a membership charge per litre of water received. The Association collects fees, manages funds and allocates payments to the upstream landowners for a variety of watershed management activities, including soil stabilisation through revegetation and fencing to prevent grazing in vulnerable areas. Since the establishment of Asoguabas, 11 new associations of water users have been formed, working in an area of over 1 million hectares. In total the 12 associations raise well over US$600,000 annually in user fees.

The outlook is not all gloomy. IIED's review found 51 examples of situations where payments are being made for landscape beauty (Box 4). It is, however, clear from these cases that market evolution is not a simple process. The introduction of payment mechanisms where none existed before means creating new institutional arrangements and involving new stakeholders. As tour operators begin to establish themselves as paying customers, communities and private landowners are seeking to compete with publicly owned protected areas. At the same time, intermediary organisations are responding to a demand for support in searching for, negotiating and implementing deals.

Box 4: Remunerating landscape beauty

Photographic permits in Queensland, Australia
Queensland offers a number of beautiful spots for filming including rainforest landscapes complete with waterfalls, lakes and wildlife. Producers of films, advertisers and photographers are increasingly willing to pay for scenic backdrops to their productions. The best spots tend to be in protected areas managed by the Queensland Parks and Wildlife Service. Recognising the potential market, the government has introduced fees, varying according to the number of people involved and the equipment used. A single photographer may pay A$20/day, while a large film crew of 50 can pay $2,000/day, plus an application fee of $2,000.

Rafting companies paying for streambank conservation, Costa Rica
Rafting companies make money from both the adventure and scenic beauty they offer their clients. In Costa Rica, some companies have become concerned that their business is threatened by streambank degradation. One company is so concerned that it is discussing paying private owners of adjacent forested land (especially natural forests) to increase the quality of standing forests as well as their coverage.

Paying for landscape beauty in Sikkim, India
Sikkim is a small Indian state nestled in the Eastern Himalayas, known for its beautiful mountain landscapes, including forests, and cultural heritage. With a population of 500,000, the state attracts about 100,000 tourists a year, 10% of which are foreigners. Ecotourism is thus a key economic activity in the area. Environmental degradation and deforestation are seen as significant threats to the sector. In response the Travel Agents Association of Sikkim launched an NGO, the Sikkim Himalayan Integrated Environment Protection Society. Support is worth about 5% of gross profits and is provided through specific projects and technical assistance. In addition to promoting local community involvement in ecotourism, support is provided for reforestation and natural resource management.

Most payments are based on site-specific negotiations or reformed entrance fees. More recently, the establishment of community-based ecotourism operations and joint ventures has allowed land stewards to tap tourists' demand directly.

Thus, despite perhaps being the oldest market of the four forest environmental services considered in this review, the market for landscape beauty remains relatively immature. Constraints to market development are well established and shifts in power balances are difficult to make. As long as tour agencies resist paying for landscape beauty, land stewards' opportunities for being rewarded for the services they provide lie in establishing themselves as marketing enterprises. Yet, without the skills to administer and manage complex international businesses, this route is fraught with difficulties – particularly for people with few resources and limited education. Some more forward-looking agencies and communities believe that ecotourism must ultimately involve a joint effort between tour operators and land stewards and the pooling of skills and resources. Whatever the model, for landscape beauty to be protected into the future, it is clear that providers must receive fair compensation for their inputs.

Market form, drivers and processes – some key lessons

While market forms, drivers, and the process of market development vary between cases, the review points to a number of cross-cutting lessons about the nature of these emerging markets which we summarise only briefly here:

Defining effective commodities is difficult. Usually, it is easy to identify commodities we buy, such as bananas or T-shirts. However, defining a commercial product to represent environmental services is extremely challenging. Communities must transform such intangible services into clearly defined products that can be exchanged for a payment. In general proxies are used. Rather than buying watershed protection services, for instance, downstream users may purchase conservation easements, ie. contracts attached to a landowner's property requiring regular investment in specific land management practices. Commodities are designed to suit beneficiaries' needs, and in some cases the same service may be sold to different buyers using different commodities.

Markets are multi-stakeholder affairs. While the private sector tends to be the main player, local NGOs, communities, governments, international NGOs and donors also play key roles as buyers, sellers, intermediaries and suppliers of ancillary services. Efforts to promote markets for environmental services should seek to capitalise on a range of stakeholders' enthusiasm and avoid alienating groups that may block market development. In certain cases targeting influential players for participation may be justified to kick-start market development, but targeting needs to be balanced with efforts to avoid marginalising weaker groups.

Competitiveness is difficult to establish in young markets. The level of competition in a sector has critical implications for the welfare impacts of markets. In general, the higher the competition, the greater the benefits for society[3]. But policy-makers need to take care that efforts to curb anti-competitive behaviour do not stifle market development.

Immaturity predominates, but momentum is growing. While most of these markets remain immature, more and more buyers are coming together to spread risks. Gradually, case-specific negotiations are being replaced by trading systems that seek to promote a greater volume of payments at lower costs, especially in the market for carbon offsets.[4]

Governance is critical for emerging markets. Global services, such as carbon sequestration or biodiversity conservation, do not necessarily give rise to global markets. Given the difficulties of defining internationally recognised property rights and regulatory oversight, local markets for global services may offer the best starting point for

3 This is based on standard economic theory which points to improved efficiency amongst producers and lower prices for consumers resulting from greater competition. The theory says nothing about the distribution of benefits.
4 For example, the planned European carbon exchange that will permit electronic trading in serialised carbon credits.

market development. In the longer-term, flexible and low-cost international payment systems depend on strengthening global governance. Successful markets often depend on the emergence of supporting regulatory and cooperative arrangements and may lead to the abandonment of outdated institutions.

Markets are not the only show in town. Markets do not exist in isolation and should be evaluated with reference to their interaction with other regulatory, cooperative or market structures. In many cases markets are evolving due to the introduction of new regulatory arrangements (eg. water quality regulations in the United States have been the key driver for the emergence of trading in water quality credits). In other cases, the survival of cooperative systems of natural resource management has been supported by the introduction of payment systems.

Drivers are inter-linked and dynamic. Individuals, events or processes that drive market creation vary. While demand-side drivers (eg. based on a growing appreciation of benefits provided by forests and awareness of threats to supply of services) have been most active in market creation to date, suppliers are becoming increasingly forthright in demanding payment. Government environmental regulations are also key in stimulating market development. An evaluation of the range of drivers points to a number of leverage points for policy-makers keen to stimulate market development. Those that stand out include awareness-raising, reducing transaction costs and trading risks, providing secure property rights and raising environmental standards.

Markets and the poor – pitfalls and opportunities

There are very few thorough assessments of the costs and benefits of these emerging markets in the literature. Most market descriptions are general, *ad hoc* and vague. Moreover, because literature tends to be written by proponents of markets, there is a heavy emphasis on benefits, and little critical analysis of costs, especially when it comes to impacts on poor communities. However, we have discerned some insights into the costs and benefits of markets, which we discuss below. We then examine the constraints which poorer groups face in accessing market benefits and suggest some ways to promote markets which can benefit the poor.

We can evaluate how markets affect the poor by looking at their impacts on the poor's essential assets. A number of asset-based approaches to evaluating welfare have been developed (Carney *et al*, 1999). In this paper we consider impacts for six assets: natural (eg. forests and land), physical (infrastructure and other man-made capital), financial (cash flows), social (informal cooperative, family or community-based support structures), human (educational and skill base), and political (access to and influence over policy-making structures). Opportunities offered by markets for improving these assets are set against risks that markets will devalue key assets (Table 1).

Table 1: Potential opportunities and risks of markets for assets of the poor

Opportunities	Risks
Natural assets • Increased forest value associated with new market opportunities • Positive spin-offs for timber and non-timber forest products where sustainable forest exploitation permitted • Positive impacts for other natural assets: – soil fertility and agriculture – water flows and quality – air quality due to reduced forest fires	**Natural assets** • New markets are inaccessible by the poor due to unclear property rights, insufficient marketing skills and education, inadequate information, lack of contacts, poor communication infrastructure, inappropriate commodity design and timescales • Opportunity costs where delivery of environmental services precludes production of timber and/or non-timber forest products
Social assets • Market may spur the formalisation of resource tenure and clarification of property rights over environmental services • Increased organisational and management capacity of community-based organisations through collaboration in delivery of, or payment for, environmental service • Protection of forest-based cultural heritage	**Social assets** • Increased competition for control over forests and loss of rights by the poor • Erosion of community cohesiveness due to increased divisions between those who gain and lose from markets • Threats to local culture as environmental services become commercial assets
Human assets • Improved education and skill base relating to forest management for environmental services, cooperation, project management, marketing, negotiation, enterprise development, etc. • Improved health due to more varied diets, improved water supply (quantity and quality), improved air quality, increased disposable income for medical treatment	**Human assets** • The poor are excluded from market or given only menial jobs, while necessary skills brought in from outside • Reduced health due to lost access to non-timber forest products and associated nutrition and reduced disposable income
Physical assets • Investment in improved communication links to remote forest areas	**Physical assets** • Investment in improved communication links are targeted at certain market participants with few spin-offs for wider community, leading to increased inequality
Financial assets • More diversified income base increases security and helps to build up financial assets	**Financial assets** • Where markets lead to exclusion of the poor from forest areas, they will have negative repercussions for financial assets • Poor buyers of services (eg. downstream communities paying for watershed services) will have unsustainable demands on their limited financial resources
Political assets • Improved community-based organisation provides a firmer basis for gaining political representation and voice	**Political assets** • Where markets lead to further marginalisation, the poor have even fewer channels for influencing policy decision-making

Table 1 highlights a number of channels through which markets may benefit the poor. It also identifies significant risks. Whether the poor realise the potential, or fall victim to the risks depends on a number of factors, which include:

- *Security of tenure*. For the poor to benefit they must have property rights over forests, and rights to income generated by environmental service sales. Where the poor lack secure tenure, a critical concern is that markets raise competition for control over forest assets and lead to exclusion and further marginalisation.

- *Skills and education*. Where the poor have clear property rights, the extent to which they benefit from market opportunities depends on their ability to participate in and compete for business. This in turn requires, amongst other things, managerial skills for organising supply (especially when a large number of landholders are involved), negotiation and contracting skills for structuring deals and technical skills for the delivery of environmental services. Low levels of education and inadequate marketing skills will place a serious handicap on participation.

- *Market information*. Access to information on potential buyers and current prices being paid for environmental services is key for sellers to be in a position to negotiate a fair deal.

- *Market contacts*. At present environmental service markets tend to be segmented, largely unregulated and highly dependent on directly negotiated deals. Knowing where to go to initiate a trade and where to find support and advice is critical. Finding an intermediary who can be trusted is essential. Market contacts take time to develop and are most easily made and solidified through regular communication. This may prove difficult to achieve for poor rural communities.

- *Communication infrastructure*. Linked to the above, an important determinant of costs of negotiating and concluding deals will relate to how accessible sellers are to buyers. Transportation and communication infrastructure is important in bringing parties together.

- *Contract design*. In general the provision of environmental services is a long-term commitment (eg. carbon offset deals tend to span decades rather than months or years). However, where the poor accept long-term contracts, there are serious risks that by locking them into a single land use for extended periods these contracts will decrease their ability to respond to shocks and thereby damage welfare.

- *Financial resources*. Participating in markets for forest environmental services is expensive. Transaction costs will tend to be even higher for the poor. Not only will the poor tend to require greater investment in skill development, but they are also more likely to suffer from inadequate communication, information, market contacts, and insecure property rights. In addition because the poor tend to have only small

plots they will generally need to join forces to attract business[5]. Collaboration requires time and effort.

Potential ways forward in developing pro-poor markets

From the above it is clear that, while the potential rewards from market development are significant, poor people are likely to face an uphill battle in realising these. Governments are critical for establishing the legal underpinnings of monitoring and enforcement mechanisms for markets. They thus have a key role to play in making markets work for poor groups. There are four key ways that governments may help to shape more equitable and inclusive markets:

1. *Assign forest service property rights*. For poor forest-based communities to be able to participate in a market for environmental services they need to be able to offer credible commitments for supply. Secure property rights are key.

2. *Strengthen capacity for market participation*. While requirements will vary depending on the context, general training programmes in marketing, negotiation, management, financial accounting, contract formulation and conflict resolution will tend to be important. Technical skills in forest management for environmental services will also be needed. It may be most cost-effective for government to support the emergence of specialised ancillary service providers and intermediaries who can offer necessary services to poor communities. A key consideration will be how to ensure service providers do not exploit their position and retain the trust of poor communities.

3. *Market support centre*. Information is power. To improve poor people's ability to participate in emerging markets, a central market support centre could offer a number of key services:
   - free access to information on recent prices and transactions
   - a contact point for potential buyers, sellers and intermediaries
   - an advice bureau to support the design and implementation of contracts
   - research which draws together emerging best-practice with respect to contract design and implementation and feeds this back through its advice bureau. This could be particularly important in the development of flexible contracts that are suitable to poor communities' needs.

4. *Access to finance*. Where finance is needed to negotiate and conclude environmental service deals, the government may have a role to play in supporting access to funds. This is especially true where banks and other formal lending institutions will not provide loans due to their lack of expertise in emerging markets, inflexible collateral laws and/or the non-existence of reliable credit registries. The government has a key role to play in providing supportive legislation and stimulating competition amongst private financial intermediaries which can result in significant increases in

5 Threshold effects associated with the delivery of certain environmental services (eg. biodiversity or watershed protection) often require that a minimum area is protected.

lending to the poor. To the extent that markets for forest environmental services increase the value of poor people's asset base, financial institutions should be encouraged to take these assets as collateral in securing loans.

Markets for forest environmental services are emerging throughout the world and the trend is set to continue. As markets evolve, governments have a critical role to play in crafting the legislative and regulatory environment to guide this process. The poor control vast areas of forests which offer valuable environmental services to both local and global communities. Finding mechanisms to ensure the poor have access to and participate in evolving market systems is key; not just for moral reasons, but also to ensure markets work efficiently and are sustainable.

References

Carney, D., Drinkwater, M., Rusinow, T., Neefjes, K., Wanmali, S. and Singh, N. 1999. *Livelihoods Approaches Compared. A brief comparison of the livelihoods approaches of the UK Department for International Development (DFID), CARE, Oxfam and the United Nations Development Programme (UNDP)*. Department for International Development, London.

Coase, R. 1937. The nature of the firm. *Economica* 4: 386.

Coase, R. 1960. The problem of social cost. *Journal of Law and Economics* 3: 1-44.

Cosgrove, W. and Rijsberman, F. 2000. *World Water Vision: Making water everybody's business*. Paper prepared for the World Water Council. Earthscan Publications Ltd, London.

FAO. 2001. *State of the World's Forests*. Food and Agriculture Organization of the United Nations, Rome.

IPCC. 2001. *Climate Change 2001: The Scientific Basis*. Intergovernmental Panel on Climate Change, Geneva.

Landell-Mills, N. and Porras, I. 2002. *Silver Bullet or Fools' Gold? A global review of markets for forest environmental services and their impacts on the poor.* IIED, London.

North, D. 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge University Press, Cambridge.

Pew Centre on Global Climate Change. July 2001. *Climate Talks in Bonn: News and Information: Summary of the Climate Change Agreement in Bonn*. www.pewclimate.org/bonn/daily.cfm?m.

Reid, W. and Miller, K. 1989. *Keeping Options Alive: The scientific basis for conserving biodiversity*. World Resources Institute, Washington DC.

Stiglitz, J.1986. The new development economics. *World Development* 14 (2): 257-65.

Williamson, O.1985. *The Economic Institutions of Capitalism*. Free Press, New York.

Gatekeeper Series

1. Pesticide Hazards in the Third World: New Evidence from the Philippines. 1987. J.A. McCracken and G.R. Conway.
2. Cash Crops, Food Crops and Agricultural Sustainability. 1987. E.B. Barbier.
3. Trees as Savings and Security for the Rural Poor. 1992. Robert Chambers, Czech Conroy and Melissa Leach. (1st edition, 1988)

4-12 Out of Print

13. Crop-Livestock Interactions for Sustainable Agriculture. 1989. Wolfgang Bayer and Ann Waters-Bayer.
14. Perspectives in Soil Erosion in Africa: Whose Problem? 1989. M. Fones-Sondell.

15-16. Out of Print

17. Development Assistance and the Environment: Translating Intentions into Practice. 1989. Marianne Wenning.
18. Energy for Livelihoods: Putting People Back into Africa's Woodfuel Crisis. 1989. Robin Mearns and Gerald Leach.
19. Crop Variety Mixtures in Marginal Environments. 1990. Janice Jiggins.
20. Displaced Pastoralists and Transferred Wheat Technology in Tanzania. 1990. Charles Lane and Jules N. Pretty.
21. Teaching Threatens Sustainable Agriculture. 1990. Raymond I. Ison.
22. Microenvironments Unobserved. 1990. Robert Chambers.
23. Low Input Soil Restoration in Honduras: the Cantarranas Farmer-to-Farmer Extension Programme. 1990. Roland Bunch.
24. Rural Common Property Resources: A Growing Crisis. 1991. N.S. Jodha.
25. Participatory Education and Grassroots Development: The Case of Rural Appalachia. 1991. John Gaventa and Helen Lewis.
26. Farmer Organisations in Ecuador: Contributions to Farmer First Research and Development. 1991. A. Bebbington.
27. Indigenous Soil and Water Conservation in Africa. 1991. Reij. C.
28. Tree Products in Agroecosystems: Economic and Policy Issues. 1991. J.E.M. Arnold.
29. Designing Integrated Pest Management for Sustainable and Productive Futures. 1991. Michel P. Pimbert.
30. Plants, Genes and People: Improving the Relevance of Plant Breeding. 1991. Angelique Haugerud and Michael P. Collinson.
31. Local Institutions and Participation for Sustainable Development. 1992. Norman Uphoff.
32. The Information Drain: Obstacles to Research in Africa. 1992. Mamman Aminu Ibrahim.
33. Local Agro-Processing with Sustainable Technology: Sunflowerseed Oil in Tanzania. 1992. Eric Hyman.
34. Indigenous Soil and Water Conservation in India's Semi-Arid Tropics. 1992. John Kerr and N.K. Sanghi.
35. Prioritizing Institutional Development: A New Role for NGO Centres for Study and Development. 1992. Alan Fowler.

36. Out of Print

37. Livestock, Nutrient Cycling and Sustainable Agriculture in the West African Sahel. 1993. J.M. Powell and T.O. Williams.
38. O.K., The Data's Lousy, But It's All We've Got (Being a Critique of Conventional Methods. 1993. G. Gill.
39. Homegarden Systems: Agricultural Characteristics and Challenges. 1993. Inge D. Hoogerbrugge and Louise O. Fresco.
40. Opportunities for Expanding Water Harvesting in Sub-Saharan Africa: The Case of the Teras of Kassala. 1993. Johan A. Van Dijk and Mohamed Hassan Ahmed.

41 Out of Print

42. Community First: Landcare in Australia. 1994. Andrew Campbell.
43. From Research to Innovation: Getting the Most from Interaction with NGOs in Farming Systems Research and Extension. 1994. John Farrington and Anthony Bebbington.
44. Will Farmer Participatory Research Survive in the International Agricultural Research Centres? 1994. Sam Fujisaka.
45. Population Growth and Environmental Recovery: Policy Lessons from Kenya. 1994. Mary Tiffen, Michael Mortimore and Francis Gichuki.

46. Two Steps Back, One Step Forward: Cuba's National Policy for Alternative Agriculture. 1994. Peter Rosset and Medea Benjamin.

47. The Role of Mobility Within the Risk Management Strategies of Pastoralists and Agro-Pastoralists. 1994. Brent Swallow.

48. Participatory Agricultural Extension: Experiences from West Africa. 1995. Tom Osborn.

49. Women and Water Resources: Continued Marginalisation and New Policies. 1995. Francis Cleaver and Diane Elson.

50. New Horizons: The Economic, Social and Environmental Impacts of Participatory Watershed Development. 1995. Fiona Hinchcliffe, Irene Guijt, Jules N. Pretty and Parmesh Shah.

51. Participatory Selection of Beans in Rwanda: Results, Methods and Institutional Issues. 1995. Louise Sperling and Urs Scheidegger.

52. Trees and Trade-offs: A Stakeholder Approach to Natural Resource Management. 1995. Robin Grimble, Man-Kwun Chan, Julia Aglionby and Julian Quan.

53. A Role for Common Property Institutions in Land Redistribution Programmes in South Africa. 1995. Ben Cousins.

54. Linking Women to the Main Canal: Gender and Irrigation Management. 1995. Margreet Zwarteveen.

55. Soil Recuperation in Central America: Sustaining Innovation After Intervention. 1995. Roland Bunch and Gabinò López.

56. Through the Roadblocks: IPM and Central American Smallholders. 1996. Jeffery Bentley and Keith Andrews.

57. The Conditions for Collective Action: Land Tenure and Farmers' Groups in the Rajasthan Canal Project. 1996. Saurabh Sinha.

58. Networking for Sustainable Agriculture: Lessons from Animal Traction Development. 1996. Paul Starkey.

59. Intensification of Agriculture in Semi-Arid Areas: Lessons from the Kano Close-Settled Zone, Nigeria. 1996. Frances Harris.

60. Sustainable Agriculture: Impacts on Food Production and Food Security. 1996. Jules Pretty, John Thompson and Fiona Hinchcliffe.

61. Subsidies in Watershed Development Projects in India: Distortions and Opportunities. 1996. John M. Kerr, N.K. Sanghi and G. Sriramappa.

62. Multi-level Participatory Planning for Water Resources Development in Sri Lanka. 1996. K. Jinapala, Jeffrey D. Brewer, R. Sakthivadivel.

63. Hitting a Moving Target: Endogenous Development in Marginal European Areas. 1996. Gaston G.A. Remmers.

64. Poverty, Pluralism and Extension Practice. 1996. Ian Christoplos.

65. Conserving India's Agro-Biodiversity: Prospects and Policy Implications. 1997. Ashish Kothari.

66. Understanding Farmers' Communication Networks: Combining PRA With Agricultural Knowledge Systems Analysis. 1997. Ricardo Ramirez.

67. Markets and Modernisation: New Directions for Latin American Peasant Agriculture. 1997. Julio A. Berdegué and Germán Escobar.

68. Challenging 'Community' Definitions in Sustainable Natural Resource Management: The case of wild mushroom harvesting in the USA. 1997. Rebecca McLain and Eric Jones.

69. Process, Property and Patrons: Land Reform In Upland Thai Catchments. 1997. Roger Attwater.

70. Building Linkages for Livelihood Security in Chivi, Zimbabwe. 1997. Simon Croxton and Kudakwashe Murwira.

71. Propelling Change from the Bottom-Up: Institutional Reform in Zimbabwe. 1997. J. Hagmann, E. Chuma, M. Connolly and K. Murwira.

72. Gender is not a Sensitive Issue: Institutionalising a Gender-Oriented Participatory Approach in Siavonga, Zambia. 1997. Christiane Frischmuth.

73. A Hidden Threat to Food Production: Air Pollution and Agriculture in the Developing World. 1997. F. Marshall, Mike Ashmore and Fiona Hinchcliffe.

74. Policy Research and the Policy Process: Do the Twain ever Meet? 1998. James L. Garrett and Yassir Islam.

75. Lessons for the Large-Scale Application of Process Approaches from Sri Lanka. 1998. Richard Bond.

76. Malthus Revisited: People, Population and the Village Commons in Colombia. 1998. Juan Camilo Cardenas.

77. Bridging the Divide: Rural-Urban Interactions and Livelihood Strategies. 1998. Cecilia Tacoli.

78. Beyond the Farmer Field School: IPM and Empowerment in Indonesia. 1998. Peter A. C. Ooi.

79 The Rocky Road Towards Sustainable Livelihoods: Land Reform in Free State, South Africa. 1998. James Carnegie, Mathilda Roos, Mncedisi Madolo, Challa Moahloli and Joanne Abbot.

80 Community-based Conservation: Experiences from Zanzibar. 1998. Andrew Williams, Thabit S. Masoud and Wahira J. Othman.

81 Participatory Watershed Research and Management: Where the Shadow Falls. 1998. Robert E. Rhoades.

82 Thirty Cabbages: Greening the Agricultural 'Life Science' Industry. 1998. William T. Vorley.

83 Dimensions of Participation in Evaluation: Experiences from Zimbabwe and the Sudan. 1999. Joanne Harnmeijer, Ann Waters-Bayer and Wolfgang Bayer.

84 Mad Cows and Bad Berries. 1999. David Waltner-Toews.

85. Sharing the Last Drop: Water Scarcity, Irrigation and Gendered Poverty Eradication. 1999. Barbara van Koppen.

86. IPM and the Citrus Industry in South Africa. 1999. Penny Urquhart.

87. Making Water Management Everybody's Business: Water Harvesting and Rural Development in India. 1999. Anil Agarwal and Sunita Narain.

88. Sustaining the Multiple Functions of Agricultural Biodiversity. 1999. Michel Pimbert.

89. Demystifying Facilitation in Participatory Development. 2000. Annemarie Groot and Marleen Maarleveld.

90. Woodlots, Woodfuel and Wildlife: Lessons from Queen Elizabeth National Park, Uganda. 2000. Tom Blomley.

91. Borders, Rules and Governance: Mapping to catalyse changes in policy and management. 2000. Janis B. Alcorn.

92. Women's Participation in Watershed Development in India. 2000. Janet Seeley, Meenakshi Batra and Madhu Sarin.

93. A Study of Biopesticides and Biofertilisers in Haryana, India. 2000. Ghayur Alam.

94. Poverty and Systems Research in the Drylands. 2000. Michael Mortimore, Bill Adams and Frances Harris.

95. Forest Management and Democracy in East and Southern Africa: Lessons From Tanzania. 2001. Liz Alden Wily.

96. Farmer Learning and the International Research Centres: Lessons from IRRI. 2001. Stephen Morin, Florencia Palis, Karen McAllister, Aida Papag, and Melina Magsumbol.

97. Who Benefits From Participatory Watershed Development? Lessons From Gujarat, India. 2001. Amita Shah.

98. Learning Our Way Ahead: Navigating Institutional Change and Agricultural Decentralisation. 2001. Clive Lightfoot, Ricardo Ramírez, Annemarie Groot, Reg Noble, Carine Alders, Francis Shao, Dan Kisauzi and Isaac Bekalo.

99 Social Forestry versus Social Reality: Patronage and community-based forestry in Bangladesh. 2001. Niaz Ahmed Khan.

100 Global Restructuring, Agri-Food Systems and Livelihoods. 2001. Michel P. Pimbert, John Thompson and William T. Vorley with Tom Fox, Nazneen Kanji and Cecilia Tacoli.

101 Social Networks and the Dynamics of Soil and Water Conservation in the Sahel. 2001. Valentina Mazzucato, David Niemeijer, Leo Stroosnijder and Niels Röling.

102 Measuring Farmers' Agroecological Resistance to Hurricane Mitch in Central America. 2001. Eric Holt-Giménez.

103 Beyond Safe Use: Challenging the International Pesticide Industry's Hazard Reduction Strategy. 2001. Douglas L. Murray and Peter L. Taylor.

104 Marketing Forest Environmental Services – Who Benefits? 2002. Natasha Landell-Mills.

105: Food Security in the Context of Crisis and Conflict: Beyond Continuum Thinking. 2002. Benedikt Korf and Eberhard Bauer.

106: Should Africa protect its farmers to revitalise its economy? 2002. Niek Koning.

Subscribing to the Gatekeeper Series

To receive the Gatekeeper Series regularly, individuals and organisations can take out a subscription. Subscribers receive nine Gatekeeper papers a year. Subscriptions are reasonably priced to subscribers based in OECD countries, and are free to individuals and organisations based in non-OECD countries. For more details or to subscribe contact: IIED, 3 Endsleigh Street, London WC1H 0DD, UK
Email: subscriptions@iied.org
Tel: +44 020 7388 2117; Fax +44 020 7388 2826, or complete the online order form at http://www.iied.org/

Other IIED Publications

For information about IIED's other publications, contact: EarthPrint Limited, Orders Department, P.O. Box 119, Stevenage, Hertfordshire SG1 4TP, UK Fax: +44 1438 748844
mailto:orders@earthprint.co.uk

There is a searchable IIED bookshop database on: http://www.iied.org/bookshop/index.html

Submitting papers to the *Gatekeeper Series*

We welcome contributions to the *Gatekeeper Series* from researchers and practitioners alike. The Series addresses issues of interest to policy makers relating to the broad area of sustainable agriculture and resource management. *Gatekeepers* aim to provide an informed briefing on key policy issues in a readable, digestible form for an institutional and individual readership largely comprising policy and decision-makers within aid agencies, national governments, NGOs and research institutes throughout the world. In addition to this primary audience, *Gatekeepers* are increasingly requested by educators in tertiary education institutions, particularly in the South, for use as course or seminar discussion material.

Submitted material must be of interest to a wide audience and may combine an examination of broad policy questions with the presentation of specific case studies. The paper should conclude with a discussion of the policy implications of the work presented.

Style

Gatekeepers must be short, easy to read and make simple, concise points.

- Use short sentences and paragraphs.
- Keep language simple.
- Use the active voice.
- Use a variety of presentation approaches (text, tables, boxes, figures/ illustrations, bullet points).
- Length: maximum 5,000 words

Abstract

Authors should also include a brief summary of their paper – no longer than 450 words.

Editorial process

Please send two hard copies of your paper. Papers are reviewed by the editorial committee and comments sent back to authors. Authors may be requested to make changes to papers accepted for publication. Any subsequent editorial amendments will be undertaken in consultation with the author. Assistance with editing and language can be provided where appropriate. All illustrations and graphs, etc. should be supplied separately in their original format (e.g. as jpeg files) as well as being embedded within documents. This will allow us to modify the images where necessary and ensure good reproduction of the illustrations in print.

Papers or correspondence should be addressed to:
Gatekeeper Editor
Sustainable Agriculture and Rural Livelihoods Programme
IIED, 3 Endsleigh Street, London WC1H ODD, UK
Tel:(+44 020) 7388 2117; Fax: (+44 020) 7388 2826; e-mail: sustag@iied.org

iied

International Institute for Environment and Development

Sustainable Agriculture and Rural Livelihoods Programme

The Sustainable Agriculture and Rural Livelihoods Programme

The Sustainable Agriculture and Rural Livelihoods Programme of IIED promotes and supports the development of socially and environmentally aware agriculture through policy research, training and capacity strengthening, networking and information dissemination, and advisory services.

The Programme emphasises close collaboration and consultation with a wide range of institutions in the South. Collaborative research projects are aimed at identifying the constraints and potentials of the livelihood strategies of the Third World poor who are affected by ecological, economic and social change. These initiatives focus on the development and application of participatory approaches to research and development; resource conserving technologies and practices; collective approaches to resource management; the value of wild foods and resources; rural-urban interactions; and policies and institutions that work for sustainable agriculture.

The Programme supports the exchange of field experiences through a range of formal and informal publications, including *PLA Notes* (*Notes on Participatory Learning and Action* – formerly *RRA Notes*), the *IIED Participatory Methodology Series*, the *Working Paper Series*, and the *Gatekeeper Series*. It receives funding from the Swedish International Development Cooperation Agency, the British Department for International Development, the Danish Ministry of Foreign Affairs, the Swiss Agency for Development and Cooperation, and other diverse sources.

ISSN 1357-9258

International Institute for Environment and Development
3 Endsleigh Street
London
WC1H 0DD

Tel: (+44 020) 7388 2117
Fax: (+44 020) 7388 2826
E-mail: sustag@iied.org
Website: http://www.iied.org/