institut du développement durable et des relations internationales – 6, rue du Général Clergerie – 75116 Paris – France – Tél. : 01 53 70 22 35 – iddri@iddri.org – www.iddri.org

idées
POUR LE DÉBAT

N° 23/2004 | RESSOURCES NATURELLES

*(ex-*Les documents de travail de l'Iddri *n°4)*

Enhancing the compatibility of market-based policy instruments for sustainable forest management

Anne-Marie Wilson et **Stéphane Guéneau** (Iddri)

Anne-Marie Wilson et Stéphane Guéneau ont présenté cette communication lors de la conférence qu'ils ont donnée, le 20 novembre 2003 à Montpellier, dans le cadre du séminaire Développement des marchés de droits d'usage pour la gestion de l'environnement organisé par le Cirad.
Ce texte n'engage que ses auteurs. En mettant ce document en ligne, l'Iddri a pour objectif de diffuser des travaux qu'il juge intéressants pour alimenter le débat.

Les documents de travail de l'Iddri, n°4

Enhancing the compatibility of market-based policy instruments for sustainable forest management

Anne-Marie Wilson & Stéphane Guéneau

Institut du développement durable et des relations internationales

Paper presented at the Séminaire permanent « Développement des marchés de droits d'usage pour la gestion de l'environnement ». Cirad-forêt, 20 novembre 2003. Montpellier, France.

Contents

Abstract

Over the last decade, market-based policy instruments (MBIs) for improving environmental protection have been promoted by many international institutions as possible mechanisms for the valuing of forest environmental services. While much attention in the international literature has focused on the potential of MBIs to reduce environmental impact/degradation, issues related to social and cultural implications of these instruments on local communities and the availability of conditions necessary for implementing these mechanisms have not been widely discussed. However, with the increased advocacy and use of MBIs in environmental policy, it is important to examine the compatibility of these instruments with multifunctionality and the broader goals of sustainable forest management (SFM) as forestry sectors and governments increasingly look to the private sector to finance SFM. In this context, we look closely at MBIs for forest environmental services and their implications for sustainable forest management. The key questions are: Are MBIs compatible with SFM and the concept of multifunctionality? And, if so, under which conditions can they contribute to all goals of sustainable development?

In the paper, we discuss the links between sustainable forest management and the role of MBIs in valuing forest environmental services. Then we look more closely at the concept of MBIs in general. This is followed by a focus on the creation of biodiversity markets, pointing out the range of commodities and payments that have been used in different parts of the world and the extent of their use. Finally, we consider key limitations of MBIs in relation to SFM that need to be addressed to enhance the compatibility of MBIs with SFM.

MBIs are now part of the environmental/forest policy portfolio but there is a need to ensure the development of an effective policy mix to achieve a variety of goals and strengthen coherence between policies. The challenge is to find and design the best market tools that, together with the right mix of policies, support all dimensions of SFM and that do not engender a uniquely economic approach to the protection of environmental public goods. Market development for MBIs needs to be based on comprehensive feasibility studies that consider the social, economic and ecological costs and benefits, that assess the distribution of impacts, risks and the potential for political resistance.

Governments and international donors and NGOs and other key actors have important roles in ensuring that MBIs and policies do not exacerbate problems contributing to biodiversity loss. All actors need to reflect principles of environmental governance increasingly expected of national governments and multilateral institutions. It has been generally recognized that forest decline is the result of the complex interplay between market failures, negative elements introduced by various policy and institutional failures and some fundamental features of societies such as the distribution of political and economic power and cultural factors. While market failure may not be the main underlying cause of forest decline in all situations, MBIs have the potential to contribute to increased private inducement to SFM. They will not, however, provide the complete solution.

Introduction

Over the last decade, market-based policy instruments (MBIs) for improving environmental protection have been promoted by many international institutions as possible mechanisms for the valuing of forest environmental services. While much attention in the international literature has focussed on the potential of MBIs to reduce environmental impact/degradation, issues related to social and cultural implications of these instruments on local communities and the availability of conditions necessary for implementing these mechanisms have not been widely discussed.

Forest multifunctionality and sustainable forest management (SFM) are concepts that emerged in international forest debates in the 1990s in response to global concerns about the rate and extent of forest decline. These terms have strong links to the concept of sustainable development, are not well-defined and are interpreted differently by different actors and stakeholders depending on their interests and values (Boscolo, 2000; OECD, 2001; Tait, 2001;

Pearce *& al.*, 2003). This makes it difficult to answer the question of how multiple use of forests is to be achieved. However, with the increased advocacy and use of MBIs in environmental policy, it is important to examine the compatibility of these instruments with multifunctionality and the broader goals of SFM as forestry sectors and governments increasingly look to the private sector to finance SFM. In this context, this paper looks closely at MBIs for forest environmental services and their implications for sustainable forest management. The key questions are: Are MBIs compatible with SFM and the concept of multifunctionality? And, if so, under which conditions can they contribute to the three pillars of sustainable development (economics, equity and sustainability)?

In the following, we discuss the links between sustainable forest management and the role of MBIs in valuing forest environmental services. Then we look more closely at the concept of MBIs and the creation of markets to protect environmental services, pointing out the range of commodities and payments that have been used in different parts of the world and the extent of their use. Finally, we consider key limitations of MBIs in relation to SFM that need to be addressed to enhance the compatibility of MBIs with SFM.

SFM and MBIs for forest environmental services

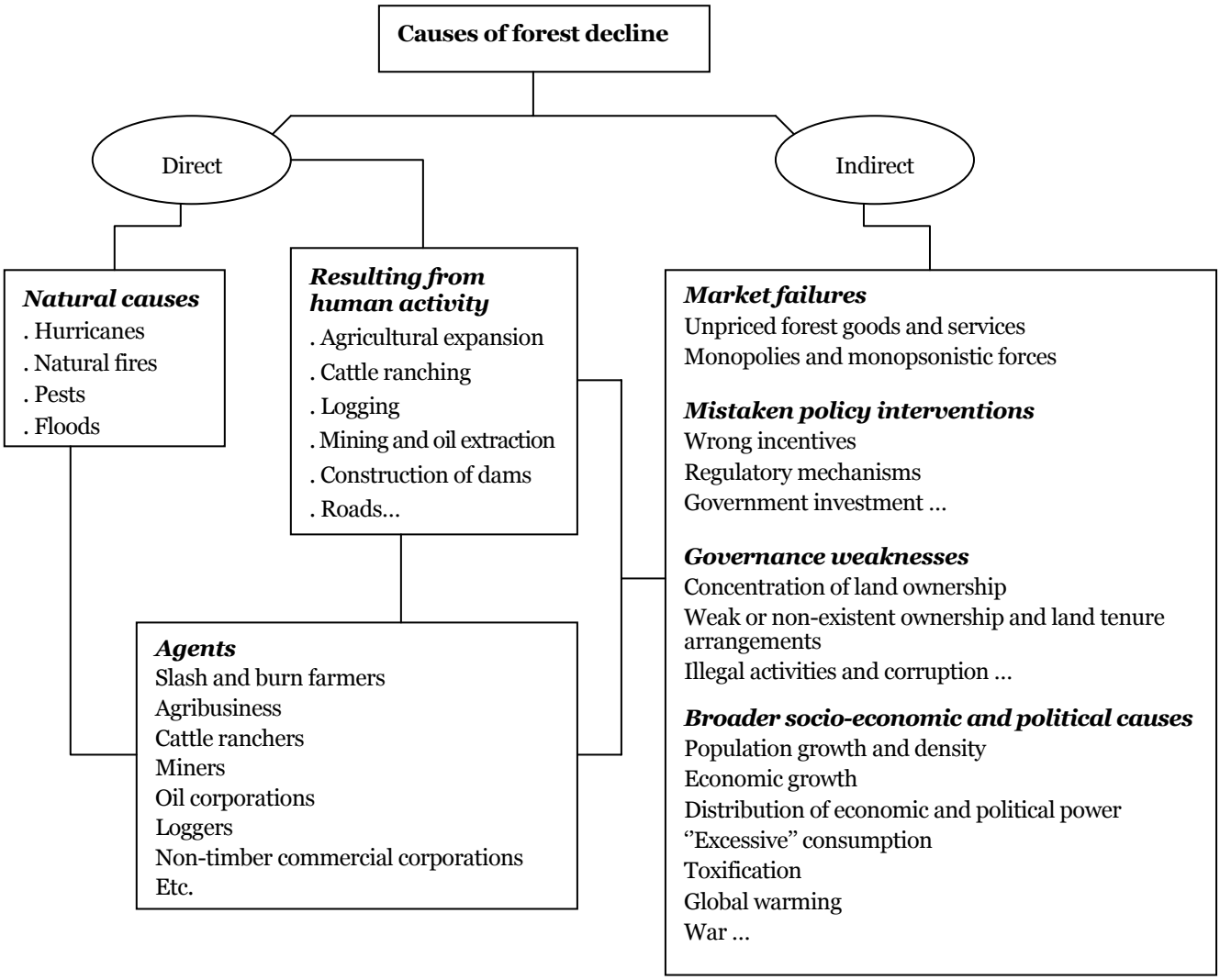
Based on the Forest principles agreed internationally in 1992, SFM encompasses the '...policies, methods, and mechanisms adopted to support and develop the multiple ecological, economic, social and cultural roles of trees, forests and forest lands.' (UN, 1992). It aims to ensure that the goods and services derived from the forest meet present-day needs while at the same time securing their continued availability and contribution to long-term development. In its broadest sense, SFM encompasses the administrative, legal, technical, economic, social and environmental aspects of the conservation and use of forests to ensure the sustainable use of forest resources. The concept combines the production of wood and non-wood forest products with the conservation of soil, water and biological diversity, with the maintenance or enhancement of the socio-economic, cultural and spiritual values of forests. At the core of the concept is the notion of the multifunctionality of forests. Multifunctionality «refers to the fact that an economic activity may have multiple outputs and, by virtue of this, may contribute to several objectives at once. Multifunctionality is thus an activity-oriented concept that refers to specific properties of the production process and its multiple outputs. ... Multifunctionality is a characteristic of the production process that can have implication for achieving multiple societal goals » (OECD, 2001).

Ideally, SFM forestry is practised within the broader context of sustainable land management, environmental stability, social and economic development with a recognition that forest communities are also part of the broader ecosystem. In forestry, the central question relating to the debate on multifunctionality concerns the synergies and conflicts that arise when timber and non-timber goods are produced on the same piece of land in forestry (OECD, 2001). The separate production of timber and non-timber products usually implies a spatial division of the total forest are into areas with intensively managed commercial forests and areas that are managed for environmental and amenity values.

SFM implies various degrees of deliberate human intervention, ranging from actions aimed at safeguarding and maintaining the forest ecosystem and its functions, to favouring specific socially or economically valuable species or groups of species for the improved production of goods and services. Decisions concerning the management of forests usually imply trade-offs between their different functions (Brun, 2002). However, SFM does not provide a practical guide for individual cases.

Addressing forest decline is challenging are of environmental policy as the causes of forest decline are extremely complex due to many inter-related economic, ecological and socio-political factors that vary in time and over geographical space (see Figure 1 for a simplified representation of the causes of forest decline; see Verholme & Moussa, 1999; Contreras-Hermosilla, 2000 for a discussion of the complex causes underlying deforestation and forest degradation). Given this, there is no universal solution. Issues need to be considered in context in order to develop appropriate, case-specific responses that are tailored to account for the operation of numerous interacting factors that contribute to forest decline in different combinations and intensities.

Figure 1. Simplified model of the numerous and interlinked causes of forest decline (from Contreras-Hermosilla, 2000).



In theory, market-based policy instruments[1] (MBIs) can potentially support the multifunctionality of forestry as they can assign a value to a variety of forest-related products and services (e.g. regulation of local and global climate, buffering of weather events, regulation of the hydrological cycle, protection of watersheds and their vegetation, water flows and soils, and storage of genetic information etc.[2]), thus contributing to the achievement of diverse societal goals by addressing market failure. However, in reality, if one looks closely at the nature of these instruments and the potential consequences for the protection of public environmental goods and services, there are a number of limitations that may reduce their potential for furthering SFM. Firstly we look at MBIs and their development in forest contexts.

[1] Policy instruments – the measures to be implemented to achieve certain policy aims and the procedural rules for their implementation in the context of policy design (Kissling-Näf & Bisang, 2001).

[2] Refer to OECD (2003) for a more detailed summary of primary goods and services provided by forests and other ecosystems (based on World Resources Institute, 2000).

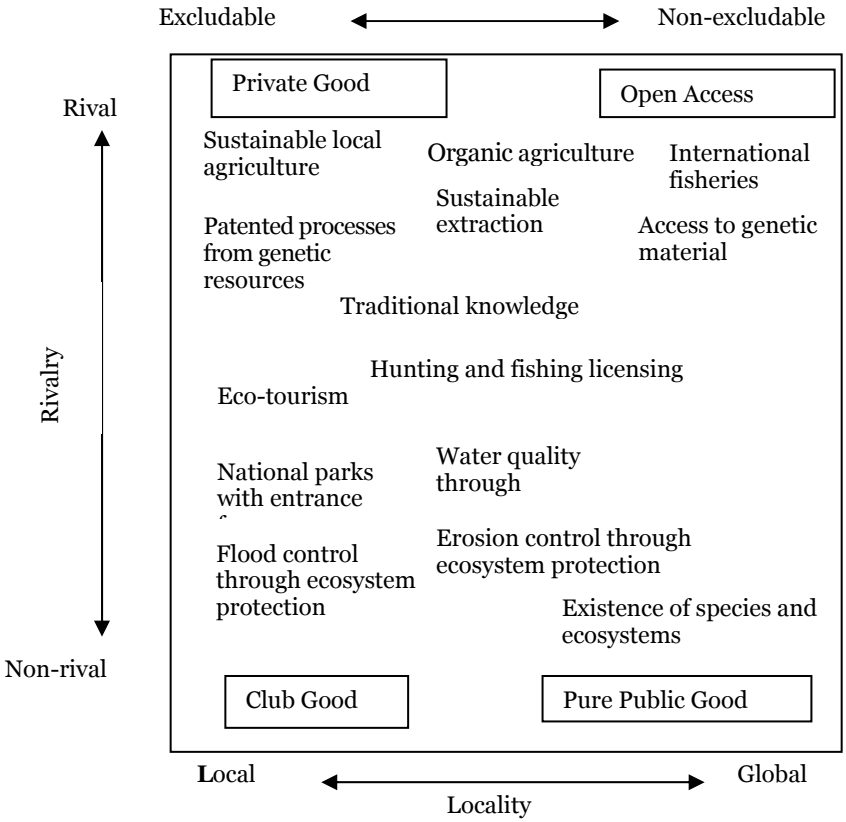
Market-based policy instruments for forest environmental services

MBIs are instruments that use market forces to achieve environmental policy objectives and specifically involve rights over public goods rather than private goods – rights to pollute, rights to develop, rights to conservation, and so forth. Their use involves the creation of markets by government intervention to develop economic incentives for the valuing and protection of a range of environmental services. They emerged in the public arena of natural resource and environmental policy debate during the 1990s, reflecting the growing importance of environmental policies, notably to manage global warming, water scarcity and biodiversity issues – herein referred to as environmental services. The public good nature of many forest environmental services has triggered discussions on the appropriate combination of property rights and forest goods (Glück, 2000).The costs of implementing ever more demanding environmental policies are rising and there is growing political resistance against the creation of protected areas, fuelled in part by reluctance to limit development needs of countries and local people (e.g. Schwartzman *& al.*, 2000).

Markets are generally considered an efficient means to distribute resources to their most valued uses. What MBIs purport to do is to achieve at least cost whatever policy objectives have been chosen by harnessing the power of cost-benefit motivations. They are flexible tools that can be tailored to meet the constraints of the context in which they are being developed. They are increasingly popular as they have the potential to enhance growth while finding the most cost-effective way to reduce negative environmental impacts and protect environmental services. Experience has shown that MBIs, which broadly speaking, provide economic incentives to modify behaviour, may be a more effective way to achieve many environmental goals (Huber *& al.*, 1998; Stavins, 2000; Sandor *& al.*, 2002).

Market failure is identified as one of the many contributing factors to deforestation and forest degradation (Figure 1). Addressing market failure through the development of markets for environmental services can provide incentives for forest landowners to take these services into account, enhancing their protection and conservation. In some situations, the failure of markets to account for non-priced benefits and costs of mismanagement may be an important underlying cause of forest decline. The development of commercial systems that capture some of the external values of forests may contribute to improved forest management that reflects a broader range of societal priorities (Contreras-Hermosilla, 2000).

Figure 2. Economic characteristics of forest goods and services: relative position of private and public goods and services types along axes of rivalry, excludability and spatial extent (from OECD, 2003)



Term	Definition
Non-Rivalry:	Means that one person's consumption of the good does not reduce its availability to anyone else
Non-Excludability:	Entails that once the good is provided, the provider is unable to prevent anyone from consuming it.
Locality:	Spatial extent.
Private goods or services:	Goods and services for which one person's consumption deplete its availability to others (rival) and for which it is feasible to exclude people from using its consumption (exclusively) by charging a price.
Public goods:	
. Open access resource:	A good that is difficult to keep non-payers from consuming but where use by one person prevents use by others.
. Club good:	Agood that is not private, but whose use is exclusive to a certain group of people (non-rival but exclusive).
. Pure public good:	Goods and services whose benefits are not depleted by an additional user (non-rival) and for which it is generally not possible to exclude people from its benefits (non-exclusive).

In the context of market-failure for trade in public goods, there is a need for greater policy intervention thus governments play a strong role in the creation of markets for public environmental goods and services. Creating markets for environmental services requires that governments establish property rights — the formal and informal institutions and arrangements that govern access to land and other resources, as well as the resulting claims that parties hold

on those resources and on the benefits they generate (McElfish, 1994 and Bromley, 1997 as cited in Wiebe & Meinzen-Dick, 1998) — that the private sector can value or exchange. This allows the creation of financial mechanisms linked to environmental services that can be exchanged to provide capital for environmental protection. MBIs focus on the creation of markets to enable the transfer of partial interests (i.e. property rights) in a property (Wiebe & Meinzen-Dick, 1998). Property rights entail a defensible claim to particular place or thing by individuals or groups of people. There are two classes two kinds of property rights - ownership rights and access (usage) rights. Clear property rights guarantee and define how owner of a resource, good, or service can use, transform or transfer his or her asset. Access rights are defined by terms imposed by owner or negotiated between owner and individual(s) desiring the use of property and does not necessarily imply ownership of the property. Societies have different ways of establishing, monitoring and enforcing property rights (see Kissling & Bisang, 2001).

Market development and exchange of finance involves the establishment of cost-sharing arrangements, the nature of which depends on property rights and legal responsibilities for conservation and the establishment of a process for registering the exchange of property rights and the procedures used to enforce this exchange and associated conditions. A proxy is used to link property rights to environmental services and represents the tradable property right. For example, rights to sequestered carbon can be established as a transferable property right over the carbon sequestered in forest plantations. This tradable instrument is a proxy for the climate stabilisation service provided by carbon sequestration.

To be effective, MBIs require that a well-defined property rights system exists that provides the legal framework for protecting for universality, exclusivity, transferability and enforceability of market arrangements (Table 1). Using these characteristics of property rights, an analysis of how well salinity, biodiversity and climate change meet the conditions under which market creation is more likely to be effective indicated that it is easier to develop markets linked to climate stabilisation than for biodiversity protection (Murtough *& al.*., 2002; see Table 2 for their comparison between climate stabilisation and biodiversity protection).

Table 1. Desirable property right characteristics to enable market creation and development for public environmental goods and services
(from Murtough *& al.*, 2002)

Property right characteristic	**Description**
Clearly defined	Nature and extent of the property right is unambiguous.
Verifiable	Use of the property right can be measured at reasonable cost.
Enforceable	Ownership of the property right can be enforced at reasonable cost.
Valuable	There are parties who are willing to purchase the property right.
Transferable	Ownership of the property right can be transferred to another party at a reasonable cost.
Low scientific uncertainty#	Use of the property right has a clear relationship with ecosystem services.
Low sovereign risk#	Future government decisions are unlikely to significantly reduce the property right's value.

Low in the sense that it does not prevent a market from forming. Moderate levels of risk and uncertainty are not necessarily insurmountable barriers to the operation of a market.

Table 2. Biodiversity and climate change: a review of desirable conditions for market creation (from Murtough *& al.*, 2002)

Property right characteristic	**Biodiversity conservation**	**Climate stabilisation**
Definition	May be able to define particular aspects of biodiversity. Difficult for transboundary and biodiversity as a whole.	Can be defined using proposed measure of tonnes of CO2 equivalent, based on global warming potentials of different gases.
Verifiable	Possible for particular aspects of biodiversity. No consensus on a comprehensive measure of biodiversity.	Likely. Measurement protocols already exist or are under development.
Enforceable	Only in certain cases.	Yes.
Valuable	Likely to be few buyers other than governments and philanthropic groups.	Likely. Emissions an unavoidable by-product of activities that are valued.
Transferable	In some cases.	Probably, given established unit of exchange.
Scientific uncertainty	High. Particularly a problem for offsets. Impacts likely to differ by location. Irreversibility could be a problem.	Relatively low, since majority of scientific opinion supports a link between emissions and climate change.
Sovereign risk	Probably high given scientific uncertainty	High unless there is a comprehensive global agreement on climate change
Sufficient buyers and sellers for a tradeable scheme	Unlikely unless reductions in biodiversity must be offset against increases.	Yes given common unit of exchange that is associated with many economic activities.

Diverse schemes that have been used to create markets for public environmental services to limit the negative impact of activities on species and ecosystems. These include instruments that limit open access regimes e.g. individual transferable quotas in fisheries, tradable hunting permits and instruments to create markets for club goods and pure public goods, e.g. tradable pollution permits for different types of air or water-based emissions, mechanisms to reduce the impact of economic development on land use – such as development rights and wetland banks (Figure 2; OECD, 2003). Market creation schemes can be divided into four categories based on whether the relevant property right is tradable and if it involves an offset arrangement (Table 3). Tradeable instruments are generally less successful in the conservation of complex entities such as ecosystems and where non-rivalry in consumption is also present (OECD, 2003).

Table 3. Different types of market creation
(from Murtough *& al.*, 2002)

	No offsets3	**Offsets1**
Non-tradeable4	Parties sell property right to undertake a certain action; relevant property right is only transferred once. e.g. farmers compete in an auction to receive biodiversity conservation grants for maintaining native vegetation. Grants are awarded to those offering the most environmental services per dollar granted.	Party can undertake an activity that reduces an environmental service if it also undertakes (or purchases from another) a separate activity that increases the environmental service by at least the same amount. Where the offsetting activity is purchased, relevant property right is only exchanged once. *e.g. a firm can increase emissions from one factory if it reduces them by at least the same amount at another factory*
Tradeable2	An upper limit is set on a certain activity, such as emitting pollutants. Parties who hold the (limited) right to undertake that activity may sell right to another party. e.g. tradeable permits to emit carbon dioxide	A party can undertake an activity that reduces an environmental service if it also pays another party for a separate activity that increases the environmental service by at least the same amount. The property right for the offsetting activity may be exchanged via an intermediary before being used as an offset. *e.g. a firm can increase its carbon emissions if it pays another party (via a broker) to sequester at least as much carbon in a forest plantation.*

Key steps in the development of markets for public environmental services include:

- identification of ecological conditions that provide direct and demonstrable benefits to people;
- determination of the economic value of the environmental service (i.e. identification and creation of a willingness to pay);
- creation or existence of an appropriate cultural, legal and regulatory context;
- awareness of rights and responsibilities of all stakeholders;
- identification of potential sellers and buyers;
- assessment of who needs to participate and who benefits and how;
- establishment of measurement and monitoring mechanisms (verification, monitoring, accounting and certification); and
- establishment of support services for market development.

Ideally, MBI development would include a detailed evaluation of market feasibility, including comprehensive cost-benefit analysis, and assessments of the distribution of impacts, risks and the potential for resistance to market development.

Challenges in the creation of markets for protection of environmental services

MBIs are increasingly being developed to provide incentives for a range of environmental

[3] Under an offset arrangement a party can undertake an action that reduces environmental services if they also undertake (or purchase from another) a separate action that increases environmental services by at least the same amount.

[4] A tradeable market creation scheme involves a property right that can be transferred between parties prior to being used. In other words, there is a secondary market for the property right.

services. During 2000-2001, the International Institute for Environment in Development undertook a global review of empirical data on emerging markets for forest environmental services (Landell-*Mills & Porras*, 2002). They analysed 287 cases of MBI development for four environmental services — carbon sequestration, biodiversity conservation, watershed protection and landscape beauty to draw out insights on market form, drivers, processes of market development with an emphasis on opportunities and constraints of MBIs. The review relied heavily on information in the grey literature to supplement that available from published/peer-reviewed sources. This reflects the new and emerging nature of MBIs for forest environmental services (Landell-*Mills & Porras*, 2002; Sandor *& al.*, 2002).

In the study, 72 (25%) case studies related to the development of markets for biodiversity conservation compared with 75 (27%) for carbon sequestration, 61 (21%) for watershed protection and 51 (17%) for landscape beauty (Table 4). The remaining case studies (10%) were related to the development of markets for bundled environmental services[5]. The majority of all cases were focussed on North America and Europe (31%) and 28% were international in scope. Twenty-four percent of cases were located in Latin America and the Caribbean and 17% were from Asia Pacific and Africa.

Table 4. The relative extent of environmental service market development
(from Landell-*Mills & Porras*, 2002)
* Total greater than 100% as some cases for bundled services counted more than once

Market	**% of cases reviewed***
Carbon sequestration	27
Biodiversity protection	25
Watershed protection	21
Landscape beauty	17
Bundled environmental services	10

Table 5. Relative scope for environmental services markets
(from Landell-*Mills & Porras*, 2002)

Market scope	**% of cases reviewed**
North America and Europe	31
International agencies	28
Latin America and Carribean	24
Asia Pacific	10
Africa	7

Biodiversity illustrates some of the opportunities and constraints of developing markets and engaging the private sector to secure capital for the conservation of biodiversity. Biodiversity, with its various meanings for different people, has a strong public goods character that inhibits the development of markets for its product services. Most biodiversity values are implicit rather than explicit and thus are often not captured by markets. Property rights over biodiversity aspects are often poorly defined and some biodiversity values are poorly reflected in markets, contributing to market failure and externalities (i.e. individuals do not have to bear the costs of actions despite their impact on others) (OECD, 2003). There are shortcomings in information; many environmental processes are complex and poorly understood, therefore information is limited or poor.

[5] Bundled environmental services – where more than one environmental service is provided simultaneously. As this topic is not addressed by this paper, refer to Landell-Mills and Porras 2002 for a discussion of these markets.

This is complicated by time lags and uncertainty where the full effects of decisions on environment and biodiversity are not known. Cause and effect relationships are unclear or difficult to establish and there is the existence of threshold effects and complex interactions. Analyses routinely conclude that of the various forest environmental services, biodiversity is the least suited to market creation (Table 2; e.g. Murtough *& al.*, 2002; OECD, 2003). By value, carbon sequestration is the most important global forest environmental service (Pearce, 1995 as cited in Contreras-Hermosilla, 2000). Nonetheless, despite these challenges, biodiversity markets are being created in different parts of the world.

MBIs for biodiversity conservation can be used to foster a range of actions that promote:

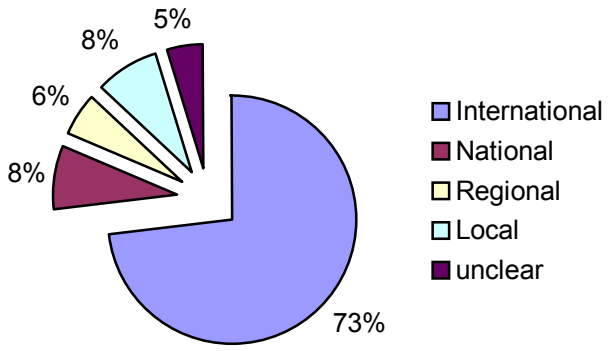
- Protection of biodiversity — such as the establishment and management of public and private parks, reserves and sanctuaries;
- Maintenance and management of biodiversity — undertaking activities in ways that do not lead to long term reductions in biodiversity, refraining from activities that reduce biodiversity, and responding to threatening processes;
- Sustainable use of biodiversity — such as the sustainable use of native forests; and
- Restoration and enhancement of biodiversity.

Extent of development of markets for biodiversity protection

This section draws heavily on the aforementioned IIED review of MBIs for forest environ-mental services completed in 2000/2001 (Landell-*Mills & Porras*, 2002). The review of 72 case studies from 33 countries points to a noticeable shift in market participation in the 1990s, despite the challenges of creating markets for biodiversity protection. Increasingly, governments, international non-government organisations (NGOs) and private companies are paying for forest biodiversity conservation, driven by growing public awareness of biodiversity benefits and threats of loss.

The review found that the establishment of protected areas[6], the purchase of bio-prospecting rights and the marketing of biodiversity-friendly products comprised 57% of market development activity. The majority (56%) of biodiversity markets were in Latin America and Asia-Pacific regions; 10% were in Africa (7 cases) and 7% were in Europe and North America. The private sector and international agencies initiatives represented around 20% of cases (Figure 3).

Figure 3. Geographical extent of markets for biodiversity conservation
(information from Landell-Mills & Porras, 2002).



On the investors-buyers side, there has been a growth in private and international NGO finance for biodiversity supplementing that provided by international donors such as the

[6] The classification of protected areas as a market development instrument is open to debate and is not considered in this paper. This classification by Landell-Mills & Porras is retained given the extent of this activity as evident later in the paper.

Global Environment Facility7. On the supply side, there has been a diversification away from governments investing in protected areas systems toward investment in local NGOs', individuals' and communities' biodiversity protection activities in mixed landscapes. While statistics on international NGO, donor and private demand for conservation are not readily available, the authors state that it is widely believed that the supply of conservation opportunities far outstrips willingness to pay for conservation.

The growth and diversification in market participation has produced significant innovation in the design of commodities and payment mechanisms. The authors of the study found that a range of commodities had been identified to market biodiversity protection/conservation services. The establishment of protected areas, the purchase of bioprospecting rights and the marketing of biodiversity-friendly products together represent over 57% of the commodities used to market biodiversity protection (Table 6).

7 Global Environment Facility (GEF) was established in 1991 to helps developing countries fund projects and programs that protect the global environment. GEF grants support projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants.

Table 6. Commodities used to market biodiversity protection services
(modified from Landell-*Mills & Porras*, 2002, Table 4 p. 28 and Box 1, p. 29)

Biodiversity commodity	**Description**	**Number of cases**
Protected areas	Protected areas are formally designated by national authorities to protect a range of environmental services, including biodiversity. These are usually categorised using World Conservation Union (IUCN) protection categories.	16
Bioprospecting rights	Bioprospecting rights allow for the collection and testing of genetic material from a designated forest area. Often purchased from a responsible government authority by pharmaceutical and biotechnology companies and research institutes in return for an up-front payment. Agreements may include future rent sharing.	12
Biodiversity-friendly products	Where biodiversity-friendly products attract a price premium, the price difference reflects consumers' willingness to pay for biodiversity protection, sold through existing commodity markets.	11
Biodiversity business shares	Biodiversity-friendly companies may attempt to capture willingness to pay for biodiversity protection by issuing shares in their business. Share purchase becomes a vehicle for expressing demand for biodiversity protection.	9
Debt-for-nature swaps	This involves the purchase of discounted developing country debt which is exchanged for domestic financial resources to invest in conservation. Payments are made in a number of ways, generally by the central bank. Funds may be channeled through trust funds, or local NGOs that act as intermediaries. These intermediaries have detailed instructions on how funds are to be spent to achieve biodiversity conservation. Swaps are less popular now than in the 1990s as debt has become more expensive and redemption rates offered by debtors less attractive.	7
Biodiversity credits/offsets	Biodiversity credits introduced as part of broader regulatory programmes that requires developers to achieve a minimum standard of biodiversity protection. Where development results in reduced biodiversity, developers would be required to offset this damage through biodiversity enhancement elsewhere.	4
Land acquisition	Amongst the simplest approaches to capturing demands for biodiversity protection is to sell the land to a purchaser whose aim is to protect the biodiversity that exists on that land.	3
Management contract	Management contracts detail biodiversity management activities, and payments are attached to the achievement of specified objectives.	3
Land lease/conservation concession	Are essentially a land lease, involving allocation of forest rights in a defined area to the leesor who commits to protect the forest from unsustainable timber and non-timber forest product harvesting. The right to protect forests is purchased from the government for an up-front payment and annual fees.	2
Conservation easements	Contracts between landowners and those who wish to protect or expand certain natural ecosystems. The owner is paid to manage their land in ways to achieve the desired conservation objective. Easements are normally signed in perpetuity, and transferred to the new owner if the land is sold. Conservation easements are similar to development rights in that the seller often gives up the right to develop an area of land, but are normally tied to a piece of land and are not transferable.	1
Development rights	Development rights are increasingly being used to promote forest conservation. Governments typically introduce development rights to increase the flexibility of land development restrictions in a conservation area. The idea is to allocate development rights up to a selected unit and to allow these to be purchased by landowners. Unattached to a particular piece of land, increasingly these rights are tradeable so that once purchased they can be resold. Conservationists may purchase development rights to prevent others from using them.	1
Research permits	These are issued to customers interested in researching different types of plants and animals.	Not available

In terms of mechanisms currently in use, trust fund intermediaries, direct negotiations and pooled transactions were preferred (see Table 7 for detail about the range of existing payment mechanisms in use). Two or more mechanisms were often combined. For example, trust funds are a popular mechanism for joint investment in conservation by donors and international NGOs. Trust funds are also viewed as a useful mechanism for leveraging co-financing from the private sector, thus the donor and international NGO conservation finance market is the most well-established. Direct negotiations are a less sophisticated mechanism for transferring funds for biodiversity protection but are especially effective where uncertainties are significant. The majority of biodiversity markets were being developed in Latin America and Asia-Pacific regions (56%); less than 10% were in Africa. Private sector/international agencies initiatives represented just under 20% of the cases assessed in the review.

Table 7. Examples of payment mechanisms used to finance biodiversity protection
(based on Landell-Mills & Porras, 2002)

Payment mechanism	**Description**	**Relative frequency of use**[8]
Intermediary based transaction	Intermediaries help to reduce the transaction costs associated with searching, negotiating and completing deals. They may lower trading risks by building up better skills to identify better transactions and vetting participants. Turst funds, local and international NGOS are the most common intermediaries.	Trust ~ 23 NGO, govt ~ 11
Direct negotiation	Payments often embedded in projects (e.g. integrated conservation and development projects) and often involve lengthy process of bargaining.	~ 19
Pooled transaction	Pooled transaction controls trading risks by sharing the investment amongst several buyers. Pooled funds may be large enough to diversify investments.	~ 19
Retail based trades	Payments attached to existing marketed biodiversity-friendly goods and services.	~ 9
Joint venture/ventur e capital	Payments involve investors offering equity input into a start-up company and channelling payments for environmental services through this new entreprise in the form of profit-sharing, cheap finance, technical assistance, direct grants, etc.	~ 7
Over the counter trades	Over the counter trades occur where the commodity is pre-packaged for sale or buyers offer to purchase a pre-packaged product.	~ 4
Clearing house transactions	A sophisticated intermediary which offers a trading platform for buyers and sellers of standardised products.	~ 4
Exchange based trades	These exist where the commodity has been standardised and can be resold in secondary, and in some cases, derivative markets such as futures or option markets.	~ 2

The authors concluded that payments for biodiversity were largely experimental at this stage, despite innovation and diversification and growth over last few years. Markets for biodiversity were generally at the trial stage. Various tools were being developed in a diverse range of contexts, allowing policy-makers and practitioners learn more about what works best where. Many potential benefits from the establishment of markets for biodiversity conservation were identified (Table 8).

[8] Estimated from figure presented in Landell-Mills & Porras, 2002.

Table 8. Summary of benefits derived from biodiversity markets
(Landell-*Mills & Porras*, 2002)

Economic Benefits	**Social Benefits**	**Environmental Benefits**
Income/profits	Education – environmental as well as broader education through support to local schools and universities	Water quality – water quality maintenance, reduced chemical pollution
Efficiency gains associated with removal of market failure; achievement of environmental target at least cost	Training – generally in fields relating to biodiversity use e.g. sample collection and identifitication required for bioprospecting	Soil quality– reduced soil erosion and maintenance of fertility, moisture and nutrients
Diversified production base, lower risks of financial shock	Health – associated with social development programmes introduced as part of payment mechanisms and as indirect benefits associated with biodiversity protection	Air quality – controlled air pollution and carbon sequestration
Employment gains – new jobs associated with emerging markets	Strengthening of social institutions – investment in building local cooperative arrangements frequently made to support markets	Landscape amenity
Improved research infrastructure associated with market development e.g. research facilities, transport, communications		
Technological transfer		
Spin-offs for eco-tourism, non-timber forest products, agriculture, carbon sales		
Foreign exchange earnings		

The picture for carbon sequestration, water quality protection and landscape beauty (as latter as a critical ingredient to eco-tourism) services is similar. They, too, are nascent, immature markets and have experienced a recent growth in market development and innovation with varying degrees of government participation. In particular, more sophisticated approaches have been developed for carbon sequestration. Trading systems are being set up in industrialised countries as a result of government efforts to introduce greenhouse gas emission caps and establish clear rules and regulations to guide market development. For all environmental services markets, innovation is the rule as new payment mechanisms are being introduced, new institutional arrangements are being created and an enlarged pool of stake-holders are learning about market participation (Landell-Mills & Porras, 2002).

A summary of key limitations of MBIs for SFM

"Particular attention needs to be given to the distribution of benefits and costs, and the repercussions for social equity. Early indications suggest a need for caution."
Landell-*Mills & Porras*, 2002

Lack of integrated assessment of costs and benefits

The IIED review found that the literature was very positive about the benefits of markets for environmental services but was relatively silent on negative impacts (Landell-Mills & Porras, 2002). Economic costs and benefits were usually evaluated from a national perspective and none

of the cases assessed described social costs associated with market development. Assessments of environmental impact were largely superficial and biased towards an emphasis on environmental benefits. These latter benefits were not usually measured, and, in many cases, intended impacts were emphasised rather than actual impacts. Some potential costs are summarized in Table 9.

Table 9. Summary of potential costs of markets for forest environmental services (Landell-Mills & Porras, 2002)

Economic Costs	Social Costs	Environmental Costs
Costs of supply – forest protection, certification.	Loss of rights to forest resources for forest-dependent people where projects involve forest protection or lead to privatization of rights to common land.	Negative spin-offs for non-marketed services: e.g. reduced biodiversity or water supplies where plantations established for carbon sequestration.
Transaction costs – searching for buyers, negotiations, contracting, establishing new intermediaries, monitoring and enforcement.	Reduced health where loss of access to forest-based foods that provide variety in local diets; also where projects involve fast growing plantations and result in reductions of water supplies.	
Opportunity costs – e.g. markets replace existing payments, lost agricultural output when forests planted on agricultural land, lost value for timber and non-timber forest products when protected.	Risks of domination by those who have the greatest wealth and therefore capacity to pay.	
	Land acquisition schemes may push up land prices and undermine local communities.	
	Negative cultural impacts associated with monetising environmental services.	

The literature was virtually silent on the issue of the distribution of benefits to poor communities living in or near forests (Landell-Mills & Porras, 2002) yet these people are often key stakeholders in delivering forest protection (Saunders & al., 2002; White and Martin, 2002). There is a widespread assumption that the range of benefits will be captured by these groups living in and near forests. However, there has been very little examination of the distribution of benefits to all stakeholders derived from the use of MBIs. There are very few systematic, comprehensive assessments or analyses of cost-benefits of initiatives and their distribution. Overall, the review found that widespread perceptions of gains were not supported by critical evaluations of costs and benefits, especially in relation to the impacts for all stakeholders and forest communities in particular.

Concerns about equity

To be consistent with the norms of sustainable forest management and good environ-mental governance, MBI arrangements should aim to be, at the very least: feasible, trans-parent, effective, cost efficient, sustainable, and equitable. However, by definition, MBIs operate on the principle of economic efficiency. While MBIs may be feasible, transparent and efficient, the focus on economic efficiency does not implicitly include consideration of sustainability and equity hence concern is rising regarding the possible ethical implications of relying on MBIs to improve environmental management (Landell-Mills, 2002; Saunders *& al.*, 2002; Smith and Scherr, 2002; Pan, 2003; Schilizzi 2003). Although MBIs operate in much the same way as markets do in general, the fact that they operate on rights over public goods poses more fundamental issues, in particular issues of equity over access to resources and the flow of benefits they generate. Like any market, MBIs are

not designed to achieve any particular form of equitable distribution (Schilizzi, 2003). Unless there is an explicit attempt to develop and implement them in ways to address the broader issues of sustainability and equity, there is likely to be an unequal sharing of benefits and costs derived from MBIs.

Limited by institutional constraints

Advocates for MBIs have prescribed solutions for environmental problems that ignore to a large extent the fact that many countries have institutional inadequacies – such as low functioning legal systems, limited experience with markets, governance issues – that mean that sophisticated MBIs are not necessarily appropriate mechanisms for environmental protection, despite the promise of alternative income generation (e.g. see Greenspan Bell, 2003).

Experience shows that developing new markets and market-based instruments that add financial value to forests is complex (Landell-Mills, 2002). There are a number of major constraints to market development. The significant transaction costs associated with setting up and implementing trades is one such constraint but there are many others that apply to even the least sophisticated biodiversity market mechanisms (Powell & al., 2002; White and Martin, 2002). These include:

- Lack of recognition of property rights and recognition of forest tenure: Assignment of property rights to forests assets and their related environmental services in ways that respect customary arrangements and community tenure is needed;
- Limited information: Limited understanding of the key dimensions of forest services such as biophysical relationships, risk management and negotiation, property rights definition, benefit sharing, comparing options to facilitate development of new mechanisms;
- Limited capacity for market participation: Many stakeholders lack marketing skills, technical knowledge and financial resources for participating in emerging markets; d
- *Limited institutional support:* Lack of enabling institutions to support efficient and equitable functioning of the market: for example, in the provision of assessment methodologies, property rights allocation and registries, certification processes, market support centres etc.

For the most part, constraints are greatest for forest communities of developing countries (Landell-Mills, 2002). While forest communities may potentially gain from biodiversity markets, there are real risks that they will not have access to the benefits or markets due to thse factors. This is more likely to be the case for those who do not have basic organisational, forest management and marketing skills. Most biodiversity exists in rural areas where people are generally poorer, where property rights are more difficult to enforce and traditional land tenure rights are often not recognised (Sayer *& al.*, 2000; Griffiths, 2001; OECD, 2003). Thus, many forest communities will not be able to benefit from MBIs that relate to their forests. For forest communities, the limitations of market-based policy instruments for environmental protection appear to be similar to those of markets for private goods and service (see for example, e.g. Scherr *& al.*, 2003).

Conclusion

How can MBIs for forest environmental services be designed to more effectively promote SFM?

MBIs are now part of the environmental/forest policy portfolio but there is a need to ensure the development of an effective policy mix to achieve a variety of goals and strengthen coherence between policies. The challenge for policy makers and other actors is to find and design the best market tools that, together with the right mix of policies, support all dimensions of SFM and that do not engender a uniquely economic approach to environmental protection. Part of the challenge is to define and distribute property rights in such a way that all relevant stakeholders can participate effectively in the resulting markets for environmental services (Wiebe & Meinzen-Dick, 1998). Market development for MBIs needs to be based on comprehensive feasibility studies that consider the social, economic and ecological costs and benefits, that assess the distribution of impacts, risks for all stakeholders and the potential for political resistance.

Market-based policy instruments are most likely to be politically acceptable when proposed to achieve environmental improvements that would not otherwise be feasible (politically or economically) (Stavins, 2003). Developing a market is inherently a political process which involves the questioning and clarification of the rights and responsibilities of different stakeholders, establishment of new rules and norms, and new entitlements. The effectiveness of MBIs will be influenced by factors such as extent of community acceptance, integration and coherence with other policies. When a policy is considered unfair, it is less likely to be supported or implemented. MBIs run this risk if they do not ensure that all stakeholders are considered in the development of markets for environmental services, especially with regard to the equitable distribution of economic, social and environmental benefits.

Recognition of shortcomings of MBIs in relation to SFM allows design to incorporate elements to specifically address those limitations. Like other policy tools, MBIs utility for SFM is dependent on the broader policy objectives of environmental services market development and implementtation. These objectives will influence to what extent MBIs will support SFM goals/principles. Specific initiatives will need to be put in place alongside the MBI in question to address issues of sustainability and equity as these are not implicit in MBIs. To be able to do this effectively, assessments of costs and benefits of MBIs to all forest stakeholders and actors, in a way that reflects the comprehensive goals of SFM will need to be completed for each market development initiative. This is needed to ensure that decisions regarding tradeoffs are made on an informed basis. This will also help to ensure that other policy objectives are not being compromised and to identify when it is important to develop initiatives to offset the negative impacts of market development and implementation. Various analyses have shown that policies in other sectors — roads, mining, agriculture and land tenure – have a great impact on forest decline (Contreras-Hermosilla, 2000). This lack of policy coherence results in negative effects on forest resources. This also needs to be addressed.

The limitations of MBIs to implicitly address equity issues is exacerbated by the fact that they are often developed in a way that does not attempt to explicitly address the range of issues pertinent to forest degradation and forest-dependent people (see Byron and Arnold (1997) for a review of these stakeholders in tropical forests and Kennedy *& al.* for a discussion about forest policy and rural development). For the more sophisticated mechanisms, conditions conducive to their development generally do not exist in places where forests are at greatest risk and where for example, biodiversity is greatest and where poor communities live. However for less sophisticated approaches such as direct negotiation, these can be developed to suit these circumstances as MBIs are flexible agreements that can incorporate aspects to deal with the uncertainties and limitations of a particular context.

There is an important role for government in improving the definition of property rights over time and recognise land tenure (White and Martin, 2002), ensure individual's decisions account for effects on others (externalities), supply or provide a means to ensure supply of public goods/environmental services, and encourage the production, exchange and dissemination of relevant information (Landell-Mills & Porras, 2002). Given their level of activity in the creation of markets for environmental services, there is also an important role for donors and international NGOs. In particular, NGOs that purport to advocate public interest should take care to reflect and engender the same principles of environmental governance increasingly expected of national governments and multilateral institutions (e.g. OECD, 2002; Putzl & Rametsteiner, 2002; World Resources Institute, 2003). For example, environmental NGOs must also be sensitive to the role of forest communities in shaping forest ecosystems, and recognise indigenous and other local community claims and property rights. It is important to fully embrace these communities as equal partners in conservation and promote strategies that recognise and compensate communities for the environmental services that their forests provide. While there are many NGOs that do incorporate these dimensions in their programs and interactions with forest communities, there are some that are focussed on the conservation of biodiversity and assess success primarily on this basis, with little integration of equity issues. It is important that governments and international donors and NGOs and other key actors ensure that their MBIs and policies do not exacerbate the problems contributing to biodiversity loss through deforestation and forest degradation.

It has been generally recognized that forest decline is the result of the complex interplay between market failures, negative elements introduced by various policy and institutional failures and some fundamental features of societies such as the distribution of political and economic

power and cultural factors (Contreras-Hermosilla, 2000; Kennedy *& al.*, 2001). While market failure may not be the main underlying cause of forest decline in all situations, MBIs have the potential to contribute to increased private inducement to SFM. They will not, however, provide the complete solution.

References

Boscolo M. 2000. Strategies for multiple-use management of tropical forests: an assessment of alternative options. Working Paper, Centre for International Development at Harvard University. (available from http://www.cid.harvard.edu/cidwp/041.htm].

Bromley DW. 1997. Constitutional political economy: property claims in a dynamic world. Contemporary Economic Policy 15(supp.15):43-54.

Brun F. 2002. Multifunctionality of mountain forests and economic evaluation. Forest Policy and Economics 4:101-112.

Byron N. and Arnold JEM. 1997. What futures for the people of the tropical forests? CIFOR Working Paper no. 19. Centre for International Forestry Research. Bogor Barat. Indonesia.

Contreras-Hermosilla A. 2000. The underlying causes of forest decline. CIFOR. Occasional Paper no. 30. Centre for International Forestry Research. Jakarta.

Greenspan Bell R. 2003. Choosing environmental policy instruments in the real world. Paper presented at the OECD Global Forum on Sustainable Development/ Emissions trading – concerted action on tradeable emissions permits country forum. OECD. Paris 17-18 March 2003.

Griffiths T. 2001. Consolidating the Gains : Indigenous peoples rights and forest policy making at the United Nations. A Forest Peoples Programme Briefing Paper. [disponible le 12 september, 2003 sur http: //forestpeoples.gn.apc.org/briefings/UNFF/briefing_unff_&_iprights_dec01_eng.htm].

Glück P. 2000. Theoretical perspectives for enhancing biological diversity in forest ecosystems in Europe. Forest Policy and Economics 1:195-207.

Huber RM. Ruitenbeek J. and Serôa Da Motta R. 1998. Market Based Instruments for Environmental Policy-making in Latin America and The Caribbean: Lessons from Eleven Countries. World Bank Discussion Paper No. 381. World Bank, Washington D.C.

Kissling-Näf I. and Bisang K. 2001. Rethinking recent changes of forest regimes in Europe through property-rights theory and policy analysis. Forest Policy and Economics 3:99-111.

Kennedy JJ. Thomas JW. and Glück P. 2001. Evolvong forestry and rural development beliefs at midpoint and close of the 20th century. Forest Policy and Economics 3:81-95.

Landell-Mills N. 2002. Developing markets for forest environmental services: an opportunity for promoting equity while securing efficiency? Philosophical Transactions: Mathematical, Physical and Engineering Sciences 360(1797):1817-1825.

Landell-Mills N. and Porras I. 2002. Silver bullet or fool's gold ? A global review of markets for forest environmental services and their impacts on the poor. Instruments for sustainable private sector forestry series. International Institute for Environment and Development. London. [available from http://www.iied.org /psf/publications_def.html#silver].

McElfish JM. 1994. Property rights, property roots: rediscovering the basis for legal protection of the environment. Environmental Law Reporter 24:10231-10249.

Murtough G. Aretino B. and Matysek A. 2002. Creating markets for ecosystem services. Staff Research Paper. Productivity Commission. Canberra. [available from www.pc.gov.au].

OECD. 2001. Multifunctionality – towards an analytical framework. Agriculture and Food Directorate. OECD. Paris.

_____. 2002. Improving policy coherence and integration for sustainable development – A checklist. Policy Brief. OECD. Paris.

_____. 2003. Harnessing Markets for Biodiversity: Towards Conservation and Sustainable Use. Environment Directorate. OECD.Paris.

Pan. J. 2003. Emission rights and their transferability – equity concerns over climate change mitigation. International Environmental Agreements : Politics, Law and Economics 3 :1-16.

Powell I. White A. & Landell-Mills N. 2002. Developing markets for the ecosystem services of forests. Forest Trends. Washington. [available from http://www.foresttrends.org/whoweare/publications.htm].

Putzl H. & Rametsteiner E. 2002. Grounding international modes of governance into National Forest Programmes. Forest Policy and Economics 4:259-268.

Sandor RL. Bettelheim EC. Swingland IR. 2002. An overview of a free market approach to climate change and conservation. Philosophical Transactions: Mathematical, Physical and Engineering Sciences 360(1797):1607-1620.

Sayer J. Ishwaran N. Thorsell J. Sigaty T. 2000. Tropical Forest Biodiversity and the World Heritage Convention. AMBIO: A Journal of the Human Environment: Vol. 29, No. 6, pp. 302–309. [http://ambio.allenpress.com/ambioonline/?request=get-document&issn=0044-7447&volume=029&issue=06&page=0302].

Saunders LS. Hanbury-Tenison R. Swingland IR. 2002. Social capital from carbon property: creating equity for indigenous people. Philosophical Transactions: Mathematical, Physical and Engineering Sciences 360(1797):1763-1775.

Scherr SJ. White A. and Kaimowitz D. 2002. Making markets work for forest communities. Forest Trends Policy Brief. Forest trends. Washington. [available from http://www.foresttrends.org/whoweare/publications.htm].

_____2003. A New Agenda for Forest Conservation and Poverty Reduction: Making markets work for low income producers. Forests Trends and Centre for International Forestry Research. [available from http://www.foresttrends.org/whoweare/publications.htm].

Schilizzi SGM. 2003. Should equity concerns impose limits on the use of market-based instruments ? Invited paper to the AARES National Symposium on Market-based Tools for Environmental Management, Canberra, 2-3 September 2003. [accessed from http://www.ecosystemservicesproject.org/html/markets/aares_symposium/].

Schwartzman S. Moreira A. and Nepstad D. 2000. Rethinking tropical forest conservation: perils in parks. Conservation Biology 14(5):1351-1357.

Smith J. and Scherr SJ. 2002. Forest carbon and local livelihoods: assessment of opportunities and policy recommendations. CIFOR Occasional Paper no. 37. Centre for International Forestry Research. Jakarta.

Stavins R. 2000. Experience with market-based environmental policy instruments. in Maler K. and Vincent J. (eds) The Handbook of Environmental Economics. North-Holland/Elsevier Science. Amsterdam.

_____2003. Environmental Protection and Economic Well-being: How does (and how should) governments balance these two important values? Resources for the Future Discussion paper. Washington. [http://www.rff.org/Documents/RFF-DP-03-48.pdf].

Tait J. 2001. Science, governance and multifunctionality of European agriculture. Outlook on Agiculture 30(2): 91-95.

United Nations Conference on Environment and Development (UNCED). 1992a. Non-legally binding authoritative statement of principles for a global consensus on the management, conservation and sustainable development of all types of forests. United Nations. New York. [http://www.un.org/documents/ga/conf151/aconf15126-3annex3.htm].

_____1992b. Agenda 21, Chapter 11: Combating deforestation. UN. [http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21chapter11.htm].

Verholme HJH and Moussa J. 1999. Addressing the underlying causes of deforestation and forest degradation – case studies, analysis and policy recommendations. Bioversity Action Network. Washington DC.

White A. and Martin A. 2002. Who owns the world's forests? Forest tenure and public forests in transition. Forest Trends and Centre for International Environmental Law. Washington DC. [available from http://www.foresttrends.org/whoweare/publications.htm].

Wiebe KD. and Meinzen-Dick R.1998. Property rights as policy tools for sustainable development. Land Use Policy 15(3) : 203-215.

World Resources Institute. 2000. World Resources 2000-2001: People and Ecosystems, Fraying the Web of Life. World Resources Institute. Washington. [available from http://www.wri.org].

_____2003. World Resources 2002-2004: Decisions for the Earth: Balance, voice, and power. World Resources Institute. Washington. [available from http://www.wri.org].