

EUROPEAN UNION TROPICAL FORESTRY PAPER 1

**'INTERNALISING THE EXTERNALITIES' OF TROPICAL FORESTRY: A
REVIEW OF INNOVATIVE FINANCING AND INCENTIVE MECHANISMS**

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EXECUTIVE SUMMARY

The main objective of this paper, commissioned by the European Commission, is to review the potential of ‘innovative’ financing and financial incentive mechanisms (IFIMs) for ‘sustainable’ forestry in the tropics, and to attempt to provide policy guidance for donors and other decision makers. The approach taken is to examine the key problems that IFIMs seek to overcome. It was found that the issues of financing and how to create positive financial incentives are not easy to separate. It is argued that the main problem is not a lack of finance *per se*, but that forestry is unattractive compared to alternative land uses, primarily due to market and policy failures which either depress the value of forest products and services, or make other land uses more profitable. Policy failures in particular cause negative or perverse incentives for forestry. Thus the key challenge is to find ways of modifying market incentives so that forestry becomes more attractive than alternative land uses, including forest exploitation. This can result either from improving returns to forestry or by reducing its opportunity cost. A key aspect of this is forestry’s time or discounting problem: forest managers can rarely afford to wait for the benefits of long-term management when alternative land uses provide much quicker returns.

For ease of analysis, the IFIMs are classified into four main approaches: those based on a transfer payments approach, comprising domestic fiscal ‘market-based instruments’ and international transfer payments; those that try to build markets for forestry’s global public good values; the channelling of private and public investment flows towards forestry; and the modification, clarification or creation of property rights. Other approaches with a high potential impact on user incentives, notably the regulatory approach, are integrated into the discussion of these four approaches.

There have been a few relatively isolated successes with fiscal market-based instruments like ‘polluter or beneficiary’ pays taxes and differential land use taxation. Market-based instruments can be used to tackle perverse incentives and bring private costs and benefits closer to social costs and benefits, so that the resulting financial incentives make forestry a case of ‘enlightened self-interest’. However the taxes have generally been set too low to achieve the necessary impact on user incentives. Similarly, forest pricing policies (royalties, concession rents, etc.) have generally underpriced the resource and encouraged rent-seeking behaviour. Bidding for forest concessions could help establish optimal timber prices, and performance bonds have the potential to overcome the crucial discounting problem of forest management, but face the same public sector implementation problems as other instruments.

International transfer payment mechanisms like the Global Environment Fund (GEF) and debt-for-nature swaps are blunt (not tied to a specific forest value) and

limited because there is little impact on user incentives, although conservation trust funds provide an important institutional basis for channelling innovative finance. International taxes, including a tax on the tropical timber trade, face severe technical and national sovereignty problems in ensuring the money is effectively spent. This is a drawback for any mechanism which does not ‘internalise’ the benefits by modifying user returns directly.

Carbon trading, timber certification, bioprospecting deals, fair trade and marketable ‘Forest Protection and Marketing Obligations’ involve market mechanisms for capturing the global ‘externality’ benefits of forestry. Of these, carbon trading has most potential since it is linked to the international regulatory process of establishing emission limits, but faces major technical and political problems. Also the market for tropical forestry carbon offsets may be smaller than previously thought (although there is a divergence of views here); and it is by no means certain forestry will be included in the Clean Development Mechanism of the Kyoto Protocol.

Timber certification suffers from both a demand and supply problem: the market is thin, and temperate countries are best placed to take advantage of it. As with other attempts to capture global externalities, international environmental regulations are essential for creating demand and willingness to pay.

Considerable hope has been expressed in channelling private international capital flows towards sustainable forestry, but with the underlying market incentives increased private capital flows could exacerbate the problems. One hope is that ethically-based equity shareholders might influence institutional portfolio priorities, while if forestry-based carbon trading takes off, a range of carbon mitigation investments could emerge.

Some argue that creating, clarifying or modifying property rights will encourage long-term investment, but this is unlikely if the underlying financial incentives are unaltered. But donors might be more active in promoting international legislation on intellectual property rights, and encouraging international environmental NGOs to experiment with tradeable development rights (TDRs) - possibly through GEF funds. At present there is insufficient global willingness to pay for TDRs.

The main reason deforestation occurs is because people find it profitable. At the same time, and by definition, ‘sustainability’ demands that the underlying problems be tackled. IFIMs should therefore counter market and policy failures as far as possible. These factors point to a high potential for carbon trading, ‘polluter and beneficiary pays’ taxes and other market-based instruments, appropriate forest pricing and performance bonds, always accompanied by appropriate regulatory measures. However the opportunity costs of promoting IFIMs also need to be considered if this means under-investing in

(arguably) more effective policies for arresting forest degradation, particularly those that counter the so-called extra-sectoral causes of deforestation. An essential complement to attempts to make sustainable forestry more attractive (which many see as a losing battle anyway) is to make forest degradation less attractive. For example, measures to discourage land speculation in frontier areas have major potential. Another set of actions or policies can reduce the pressure on the forest by increasing the opportunity cost of forest-degrading activities, for example, by increasing the attractiveness of alternative non-forestry livelihoods. Priorities include investing in human capital (for example, rural education) and increasing the productivity of labour-intensive agriculture away from the frontier.

The paper also concludes that no IFIM will work unless and until there is effective regulation, whether at the national or international level. For example, if tackling a policy failure increases stumpage values, the profitability of forest exploitation will also be increased. Effective regulations requires strong institutions. Supporting the development of National Forestry Programmes and sectoral institutional reform should lead to more positive sectoral policies, and can ensure IFIMs form part of a more holistic strategy involving, for example, the development of a policy and legal environment favouring public-private partnerships.

The ‘catch-22’ of IFIMs is that the instruments with higher potential tend to face most technical and political problems. Tackling policy failure is likely to have the most impact, but forestry is not always high up a country’s set of priorities. Analysis of the distribution of the costs and benefits of sustainable forestry and the options for donors implies that there could be a global negotiating table for IFIMs in which governments undertake to tackle policy failure as long as donors make every effort to capture and return global externalities.

ABBREVIATIONS (occurring more than once and additional to those in common usage)

CDM	Clean Development Mechanism (of the Kyoto Protocol)
CIFOR	Center for International Forestry Research
CoP	Conference of the Parties (of the FCCC)
CTO	Certified Tradeable Offset
DFID	Department for International Development, UK
EFI	European Forestry Institute
EU	European Union
FCCC	Framework Climate Change Convention
FD	Forestry Department
FMU	forest management unit
FONAFIFO	National Fund of Forest Finance, Costa Rica
FPMO	Forest Protection and Management Obligation
FPA	Forest Partnership Agreement
FSC	Forest Stewardship Council
GEF	Global Environment Fund
IDB	Interamerican Development Bank
IFA	International Franchise Agreement
IFIM	innovative financial incentive mechanism
IPCC	Intergovernmental Panel on Climate Change
ISO	International Standardization Organization
ITTO	International Tropical Timber Organization
IUCN	International Union for the Conservation of Nature
JI	Joint Implementation
MBI	market-based instrument
NEF	National Environment Fund
NFM	(sustainable) natural forest management
NFP	National Forestry Programme
NGO	non-governmental organisation
NPV	net present value
NTFP	non-timber forest product
OCIC	Costa Rica Joint Implementation Office
TDR	tradeable development right
VAT	Value Added Tax
WTO	World Trade Organization

NOTE:

Unless otherwise stated, the values presented in this paper are in US dollars.

GLOSSARY

Biodiversity prospecting

The creation of markets for potentially valuable genetic resources through contractual agreements between the owners of genetic resources and pharmaceutical firms or other parties interested in commercial development of those resources

Carbon (offset) trading

In the forestry context, this refers to a trading agreement between two parties or countries involving a commitment by forest users to a management plan which maximises carbon sequestration and/or minimises carbon loss in exchange for an annual payment representing a carbon credit to the purchaser of the carbon offset

Debt swap

A debt-for-nature swap involves purchase of a country's debt at a discount on the secondary debt market and its redemption in return for environmentally positive actions on the part of the debtor government

Direct use values

Benefits that accrue directly to forest users, whether extractive (timber, NTFPs) or non-extractive, e.g., education, recreation, etc.

Discounting

A system for measuring future costs and benefits in terms of their present value, based on the concept that it is better to have money (or utility) sooner rather than later since it can be invested and generate income or welfare

Discount rate

The reciprocal of the interest rate, measuring the rate at which future values decline in terms of their present values. A high discount rate reflects a strong preference for present consumption, while a low discount rate implies a relatively high value is placed on future consumption.

Existence value

The value placed by non-users on an asset (e.g., a forest or the biodiversity it contains) for the fact that something exists; sometimes referred to as its 'intrinsic' value

Externality

An unintended cost or benefit of production or consumption that affects someone other than the producer or consumer, and where the cost or benefit is not 'internalised' in people's cash flows since it is external to the market place. More simply we can think of externalities as non-marketed costs or benefits of forest actions which normally occur outside the forest or project boundary

Incentive

In this paper the term is used very broadly to refer either to a policy instrument and the signal or message sent out to stakeholders, or to the result of a policy instrument in terms of a modified stakeholder attitude to the resource. It should not be confused with a financial subsidy

Indirect use values

Benefits that accrue indirectly either to forest users or non-users, primarily in the form of ecological or environmental services

Joint implementation

Carbon trading between two countries with the objective of reducing the global cost of climate mitigation efforts (the Kyoto Protocol narrowed the definition of joint implementation to carbon trading between OECD Annex B (industrialised/transitional economy) countries)

Market failure

Where markets are absent or highly imperfect, and thus prices are a poor guide to resource scarcity and consumer welfare

Net Present Value

The present value of benefits less the present value of costs following the use of a discount rate

Opportunity cost

The value of something in what has to be given up to achieve it, or more specifically with reference to resource allocation, the foregone net benefit from the best alternative use of the resource

Perverse incentive

A perverse incentive is a negative signal sent out or received forest users as regards sustainability, and normally refers to an unanticipated side-effect of well intentioned policies

Policy failure

Policies that either provide a disincentive to sustainable (natural resource) management, or that fail to correct for market failure

Stumpage value

The residual value left after deducting harvesting, processing, marketing and transport costs, as well as any fees or taxes, and a reasonable profit margin, from the sale price of a processed or unprocessed product; it therefore represents the standing value of the tree, and is the maximum someone would be prepared to pay for it

Total economic value

The total value of the forest resource, comprising direct, indirect and non-use values

Trade-off

A situation in which meeting one objective means that another objective(s) cannot simultaneously be met to the same degree

Willingness to pay

The amount of money or payment-in-kind people are willing to pay for something. It is the true demand or 'value-in-use' price corresponding to the welfare or 'consumer utility' derived from consuming it, and may therefore be higher than actual 'value-in-exchange' prices in the market place

1. INTRODUCTION

1.1 Objectives and structure of the paper

The main objective of this paper, commissioned by the European Commission, is to review the potential of ‘innovative’ financing and financial incentive mechanisms (IFIMs) for long-term or ‘sustainable’ forestry in the tropics, and to attempt to provide policy guidance for donors and other decision makers. The term sustainable forestry, or more simply forestry, is used here as a shorthand for attempts to sustainably manage or conserve either naturally regenerated or planted trees. It therefore covers (sustainable) natural forest management (NFM), forest conservation, farm forestry and plantations. To approach this task, the following basic questions need to be answered.

- Why are IFIMs needed?
- What are the advantages and drawbacks of each mechanism or policy instrument, based as much as possible on the experience of using them?
- How can donors and policy makers prioritise IFIMs?

This paper therefore adopts the following structure:

- discussion of the problems which IFIMs seek to overcome (Section 2);
- description of a range of IFIMs and analysis of their potential and constraints (Sections 3-7);
- discussion of some of the institutional aspects of IFIMs (Section 8);
- discussion of the relative merits of IFIMs, particularly in terms of the feasibility of implementation and their effectiveness in overcoming the problems (Section 9).

1.2 Defining innovative financing and incentive mechanisms for sustainable forestry

A simple definition of sustainable forestry is forestry which can be continued over time without a reduction in the total economic value of the goods and services produced, and thus one in which future generations can enjoy a measure of consumer welfare at least equal to the present generation. It is essential to distinguish between the type of ‘forestry’ under discussion. There are important differences between NFM, conservation forestry, trees on farms, plantations, timber or non-timber forest product (NTFP) processing, etc., in terms of the mix of market and non-market values at the local, national and global levels, user objectives, timing of costs and benefits, investment requirements, risk, etc. Thus the financial problems of different types of forestry vary greatly. Here the main emphasis is on natural forest management and conservation, although the issues surrounding planted trees are also touched on.

There is no obvious definition of innovative financing and incentive mechanisms. The word ‘innovative’ can be misleading, since some of the mechanisms have been used in other sectors - however they may be innovative for the forestry sector. Also the extent to which they are ‘new’ is not a very useful policy distinction: policy makers and donors are more concerned with criteria like the political feasibility of introducing a mechanism, cost-effectiveness, etc.

Secondly, an IFIM may not actually result in a new or additional source of finance. Many of the initiatives included in the ‘innovative financing’ literature refer to instruments that alter the financial incentives¹ for forestry. It can be argued that additional finance is only really needed because financial incentives for NFM and conservation are generally weak. In many cases, what the IFIM does is to ‘capture’ value through some kind of economic transaction or charge on the non-marketed portion of people’s willingness to pay for forest goods and services: these non-market values are often referred to as public good values or externalities.² ‘Internalising the externalities’ can be thought of as the process by which non-marketed costs and benefits become reflected in the financial returns to the resource users or managers. It is therefore difficult, and not very useful, to separate ‘financing’ and ‘incentive’ mechanisms: the problem is one of financial incentives for forestry. This leads to a preliminary definition of an IFIM as *an (innovative) financial incentive mechanism which results in new or increased finance and/or modifies the flow of private costs and benefits in a way that stimulates sustainable forestry.*

1.3 Classification of financial incentive mechanisms

Table 1 attempts to classify IFIMs, and some other less innovative mechanisms like forest pricing and tree planting subsidies.³ This exercise inevitably suffers from some arbitrary judgements and a degree of overlap (e.g. tradeable development rights could also be considered under international transfer payments and market-based approaches), but it provides a useful structure for the rest

¹The word ‘incentive’ is used in many different ways in the literature but rarely defined. It should not be confused with a financial subsidy. In this paper an ‘incentive’ refers either to a policy instrument and the signal or message sent out to stakeholders or to the result of a policy instrument in terms of a modified stakeholder attitude to the resource. Thus a ‘positive incentive’ can be a positive signal or effect (on sustainable forestry), while a ‘perverse incentive’ refers to a negative signal or effect which is often an unanticipated side-effect of an intended positive policy instrument.

²An externality in the forestry context can be defined as a harmful or beneficial effect of a forest-related activity felt by a third party, and in which the person responsible for it does not incur a cost or receive a benefit. More simply we can think of externalities as non-marketed costs or benefits of forest actions which normally occur outside the forest or project boundary.

³These are included in Table 1, partly because they can be adapted in ‘innovative’ ways, but more because any assessment of financial incentives should take account of the lessons of more traditional mechanisms.

of the paper. Four main categories of actions are presented and classified according to whether they rely more on domestic or international initiatives:

- a transfer payments approach involving the transfer of costs or benefits between different stakeholders: national actions involving a range of fiscal ‘market-based instruments’ (Section 3) are distinguished from international transfer payments (Section 4);
- the promotion of market or trade-based solutions involving public good benefits or the ‘global externalities’ of forestry (Section 5);
- promoting and influencing the flow of private and public sector finance to support forestry (Section 6); and
- a property-rights approach, in which rights over forest resources and utilisation are created, clarified or modified (Section 7).

Table 1 combines a wide range of mechanisms, some more concerned with sources of finance (e.g. taxing the

international timber trade, debt swaps); those which refer to a means of converting innovatively raised finance into an incentive for forestry (e.g. area-based payments); fiscal mechanisms in which both of these aspects are combined; market transactions in which externalities are directly internalised (e.g. carbon trading, bioprospecting deals); and others in which the mechanism is not financial, as in the case of the property rights approach, but where a strong impact on investment incentives might be supposed. These distinctions are important, and are further analysed in this paper; for example, it is one thing to raise additional finance, and quite another to ensure it results in a positive financial incentive.

Two important approaches with an impact on financial incentives are omitted from Table 1: the regulatory approach and ‘indirect incentives’ (extension, research, training, etc.). The regulatory approach involves control of the forest estate, forest legislation, trade restrictions, and at the international level, international legislation and

Table 1. Classification of (innovative) financial incentive mechanisms

	Mainly Domestic	Mainly International
Transfer Payments Approach	Fiscal market-based instruments (MBIs) and subsidies: ‘polluter and beneficiary pays’ taxes; ‘ecological VAT’; differential land use taxes; forest pricing (including concession bidding, performance bonds); tree planting subsidies	International transfer payments: debt-for-nature swaps; Global Environment Fund; National Environment Funds or conservation trust funds; international timber trade taxes; area-based payments to forest management units; other international taxes
Market Approaches based on Public Good Benefits		carbon offset trading; fair trade; certification of forest products; bioprospecting deals; Forest Protection and Management Obligations
Private/Public Investment Flows	micro-finance to local users	channelling private international flows, especially portfolio capital; multilateral funds to stimulate private investment and public/private financing
Property Rights Approach	clarifying existing property rights; creating community usufruct rights; tradeable development rights (TDRs); overlapping property rights; service concessions	international TDRs, franchise agreements and conservation easements; intellectual property rights

agreements. Regulation is hardly an innovative approach, but is an essential complement to the IFIMs which are the main focus of this paper. The regulatory approach is therefore integrated into the discussion of the four approaches. ‘Indirect incentives’ respond to problems of ‘information failure’, and are given prominence by McGaughey and Gregersen (1988) in their review of investment policies and financing mechanisms, but the focus of this paper is on mechanisms with more direct impacts.

2. WHY ARE INNOVATIVE FINANCIAL INCENTIVES NECESSARY?

‘Deforestation, including the cutting of woodlands and scattered trees, occurs because someone finds it profitable’ (Douglas and Magrath, 1996:4)

2.1 The environmental, social and economic importance of tropical forestry

From the international perspective, the main concern is the desire to safeguard global public good values associated with environmental functions, genetic and biodiversity existence values. While there is still great uncertainty about the global impacts of increasing deforestation, there is enough evidence to evoke the ‘precautionary principle’ based on minimum ecological or environmental standards, and in which the aim is for future generations to inherit a level of environmental welfare no less than that currently available. From the national perspective, watershed protection benefits compose another important type of externality benefit from forestry. All this has led to a greater urgency over the last decade or so to internalise the externalities.

Additionally, hundreds of millions of people⁴ depend, to a greater or lesser extent, and directly or indirectly (e.g. in downstream processing and marketing activities) on tropical forests for a significant part of their livelihood, and sometimes habitat, needs. Degradation of the forest resource can carry with it serious welfare and cultural consequences - as well as increase the economic burden to government. Timber and a range of NTFPs are important in many domestic economies, and represent major inputs into the manufacturing and commercial sectors of industrialised countries. Taxation of the forest rent can be an important source of government revenue.

These viewpoints need to be balanced by the argument that in many situations deforestation has been an invaluable process of converting natural to social capital for the benefit of a greater number of people than would have benefited from forest retention. Forestry is not normally a major priority for tropical countries; for example, Lopez (1997) argues that nutrient mining is a more rational approach for large parts of Amazonia given Brazil’s stage of development. Thus Kaimowitz et al. (1998) point out

⁴For example, a DFID (1998) leaflet estimates that forests provide fuelwood to some 2000 million people.

that deforestation can often be appropriate, and that any policy analysis needs to distinguish between ‘appropriate’ and ‘inappropriate’ deforestation.

2.2 Estimating the ‘need’ for additional finance

Some international agencies have tried to calculate how much is needed to finance sustainable forestry, based mainly on developing the capacity of the state to manage and control its forest estate. A 1994 International Tropical Timber Organisation (ITTO) estimate of the additional finance to achieve necessary ‘minimum’ improvements in policy and legislation, enforcement, boundary defence, improved logging, sustained yield assessment and monitoring, training, research and public education on an estimated permanent tropical forest estate of 360 million hectares came to \$11.2 billion or \$2.25 billion annually over a five year period (Chandrasekhran, 1996). But such exercises result in widely divergent figures depending on the assumptions used: an earlier ITTO study estimated a minimum of \$330 million per annum in additional finance to achieve sustainable forest management by 2000 (reported in Barbier et al., 1994b), while the cost of implementing a much wider range of programmes was estimated by the UNCED Secretariat at \$31 billion per annum over an eight year period to 2000 (Chandrasekhran, 1996).

This paper does not attempt to assess the usefulness or accuracy of such varied estimates, nor does it attempt to quantify existing private and public sector financial flows to forestry as in some studies (notably Chandrasekhran, 1996; Moura Costa et al., 1999). It rather takes the view that the main challenge is how to provide positive financial incentives to forest users or managers so that they are encouraged to move towards more sustainable forestry. If this could be achieved (admittedly a big ‘if’), the need for additional finance would be greatly reduced. One prominent view is that the forestry sector could be self-financing through effective taxation of the forest rent (Repetto and Sizer, 1996). While this paper does not completely share the latter view, it agrees that the main priority is appropriate incentives and regulations rather than additional finance, although the latter will be crucial for the policy and institutional reforms necessary to identify and put into place the appropriate incentives and regulations.

2.3 The financial problems for forestry

It is argued here that for NFM and conservation, as opposed to trees that are planted, market values provide insufficient incentives for long-term forestry, and alternative land uses, including short-cycle logging, are usually more attractive.⁵ For example, ITTO research on the profitability of NFM in Malaysia (reported by Pearce

⁵There are exceptions to this, for example for some NTFPs found in oligarchic forests, and where markets are easily accessed (e.g. *varzea* forests producing *açai* juice for sale in Belem (Anderson and Jardim, 1989)).

and Moran, 1994) resulted in a net present value (NPV) of \$230 per ha assuming relatively high yields, low costs, and a 6% discount rate. This was less than a tenth of the return from one-off logging, while the returns - including subsidies - from a variety of cropping systems in developing countries were estimated to range between \$350 and \$600 per ha (Pearce and Moran, 1994). A recent assessment of forestry options in Latin America by Southgate (1998), including 'high value' NTFPs, bioprospecting deals, eco-tourism, etc., reached the same gloomy conclusion that NFM and conservation does not 'pay'.

Box 1 discusses some of the economic problems of NFM, both as regards timber and NTFPs. It is not only economic conditions that have to be right for NFM to work. According to Poore et al. (1989), the necessary conditions for NFM include *inter alia* land and tree tenure security, availability of markets for forest products, and access to technical and economic information on NFM.

2.4 'Underlying' causes of deforestation: market and policy failure

Section 2.3 identifies that the basic problem for NFM and conservation is that under most conditions it is not profitable or attractive compared to alternative land uses. It is therefore necessary to examine in greater detail why forestry is not profitable, as this will reveal the key challenge for IFIMs. Various sources list 'underlying' causes of deforestation and biodiversity loss. OECD (1995:42) observes that 'the underlying causes of biodiversity loss include: population growth, market failure, intervention failure (price distortions), integration failure, uncertainty and incomplete information, property rights and international trade'; Douglas and Magrath (1996) point out that deforestation happens because people find it profitable, and identifies market and policy failures as 'the key contributors' to this; and Barbier et al. (1994a: 78) mention that 'market, policy and institutional failures interact as the driving forces behind biodiversity loss'. Some 'underlying causes' like population growth

Box 1. The economics of market-orientated natural forest management (NFM)

Leslie (1987) pointed out over a decade ago that returns to forest management are likely to be low, if only forest product values are included, due to the 'cost' of time resulting from slow natural growth and high interest or discount rates.⁶ High discount rates, associated with high risk, encourage forest mining as opposed to NFM. In Amazonia it was found that forest management is unattractive at any discount rate above 1% (Verissimo et al., 1992). Another problem is the slow growth in forest product prices. Southgate (1998) points out that timber prices are depressed due to the still abundant supply of timber, much of it illegal and from unmanaged natural forests.

Several studies purport to show the long-term viability of NTFP extraction, most famously Peters et al. (1989). Such studies are based on ex-ante technical and economic parameters and suffer from various doubtful assumptions about effective demand or price elasticity, marketing and transport efficiency, and sustainability of the resource - for example by ignoring tenure issues. There has sometimes been a confusion between stock (what's in the forest) and flow (what comes out of it) values, and economic results have not always been expressed in terms of the limiting factor (usually labour) corresponding to local users' decision-making criteria. Ex-post studies like that of Pinedo-Vasquez et al. (1992) show actual profitability to be a fraction of that in the ex-ante studies, and that alternative land uses are generally much more attractive.

For community-based NFM using common pool resources, the financial problems seem to be particularly acute. This is because the activity tends to take place on low value forest land (higher value forest is usually managed by more powerful interest groups); the high risks and thus discount rates; and institutional weaknesses resulting in high transaction costs. For indigenous communities with limited prior exposure to markets, for example in some Amerindian societies, there are particular dangers of pushing market-orientated NFM. This is due to the clash of individualistic market economy incentives and the 'gift economic' incentives that hold together the common pool regimes underpinning traditional natural resource management (Richards, 1997a). This clash of incentives also increases risk and discount rates.

⁶ The cost of time is measured by the discount rate. A discount rate, which is the reciprocal of the interest rate, is used to convert future flows of costs and benefits back to a present value. The discount rate used in an economic analysis should reflect people's 'time preference' for present against future consumption. This is dependent on a range of factors including cultural factors, exposure and attitudes to risk, and the strength of supportive institutions.

Box 2. Market, policy and institutional failure

Market failure occurs due to absent, distorted or malfunctioning markets in which forest goods and services are undervalued or not valued at all. Major sources of market failure include:

- externalities in which the effect of an action on another party is not taken into account by the perpetrator;
- missing markets for environmental services and other ‘open-access’ public goods;
- market imperfections like a lack of information and knowledge, which causes uncertainty;
- monopsonic (near-monopoly) competition.

Policy failure occurs both when the state fails to take action to correct market failures, and when policies are implemented which further distort prices and cause disincentives for sustainable management. These can either be forest sector policies or ‘extra-sectoral’ policies, most commonly agricultural sector or macro-economic policies. Common examples of policy failures believed by most analysts to encourage deforestation are:

- weak state control over its forest estate: e.g. illegal logging resulting in depressed domestic timber prices;
- low forest fees which underprice forest products from state land;
- protection of forest industries through trade restrictions like log export bans;
- subsidised inputs and credit for land-extensive agriculture and livestock.

Extra-sectoral policy impacts, especially those coming from macro-economic policies or adjustments, are unpredictable, and give rise to various social, environmental and economic impacts. In many cases these policies may be necessary for a healthy economy (e.g. devaluation, which encourages short-cycle agro-export farming). Thus corrective environmental policies are politically complex. An important type of extra-sectoral policy failure for tropical deforestation is poorly planned transport infrastructure and subsidies which encourage land speculation.

Institutional failure occurs where institutions are poorly designed, do not coordinate well or do not exist (Wells, 1997). Several sources discuss the links between institutional and policy reform (Simula, 1996). These issues are further discussed in Section 8.

Source: mainly OECD (1995)

and international political economy pressures⁷ are clearly beyond the scope of IFIMs: Box 2 therefore focuses on market, policy and institutional failure.

An important aspect of market failure for tropical forestry is the problem of ‘missing markets’ for environmental services and other non-market benefits, like biodiversity and existence values. While there are no markets for these benefits, those responsible for producing them are not compensated for their supply costs, and those responsible for reducing their quality or eliminating them do not pay the environmental and social costs of their actions. Therefore it has been argued that ‘the inability of tropical foresters to suggest ways of valuing the goods and services from the forest, which are meaningful to their colleagues in national treasuries and planning ministries, has been a major factor in the continuing loss of these forests’ (Poore et al., 1989). This problem has given rise to a large literature, particularly by environmental economists, on how to compensate forest managers and tax the ‘polluters’; many of the IFIMs reported here attempt in some way to tackle the ‘missing markets’ problem.

⁷Kaimowitz and Angelsen (1998) anyway point out that the econometric evidence is weak and inconclusive about these factors as causative variables.

An important consequence of market and policy failure is that market prices do not reflect the ‘true’ private costs and benefits of resource use, and convey misleading information about resource scarcity. This often results in ‘perverse’ or negative incentives for sustainable management. Market and policy failures cause an undervaluation of forest products and land compared to other market uses, resulting in a disincentive for long-term investment in the resource (OECD, 1995). However the converse, that proper valuation of forest resources encourages long-term investment, is far less certain. This is because market prices reflecting ‘true’ private costs and benefits still favour short-term profit generation and pay no attention to irreversibilities or other environmental or social considerations. In fact econometric evidence assessed by Kaimowitz and Angelsen (1998) implies that removing a policy failure like a log export ban can sometimes increase deforestation. This is because when stumpage values are increased, forest exploitation is also encouraged.

Therefore a further stage is needed for the promotion of positive user incentives: once the main policy and market failures leading to resource undervaluation have been tackled, private returns need to be brought as close as possible to social returns (OECD, 1995). This may be

Box 3. 'Beneficiary and polluter pays' fiscal transfers to forest owners in Costa Rica

The 1996 Forestry Law introduced a system of compensatory payments for environmental services to forest owners to be financed through a range of financing mechanisms based mainly on the 'beneficiary and polluter pays' principle. This policy evolved from dissatisfaction with earlier fiscal systems of stimulating forestry based on subsidies from the national budget.

The Tropical Science Centre in Costa Rica undertook an economic study in 1996 to estimate the value of four public good benefits from forestry: carbon sequestration, water conservation, biodiversity conservation and 'natural beauty'. The estimated value was US \$58 per ha per year for primary forest, and \$42 for secondary forest; carbon sequestration accounted for about two-thirds of this value. The 1996 Forest Law formalised a system of incentive payments as part of the Private Forestry Programme. Forest owners would receive annual payments for five years following the signing of a contract that they would maintain their forest under the same regime for a minimum of 20 years. For forest conservation, owners will receive \$56 per ha annually (totalling \$280 per ha) and be exempt from land tax. Those opting for natural forest management will receive \$47 per ha for five years (\$235 in total), while those proposing to reforest agricultural land will receive a series of payments related to the costs of plantation establishment up to a total of \$558 per ha.

Proposed 'polluter and beneficiary pays' taxes include a 15% tax on fuel and petroleum products (the 'ecotax'); an annual 'forest conservation tax' of \$10/ha on the catchment areas of hydro-electric and water companies; and a tourist tax. One third of the fuel ecotax was earmarked for the environmental service payments. The expectation was that these charges would be passed on to consumers in the form of higher prices, resulting in more frugal use of the 'polluting' resources (this assumes a price elastic demand). Other sources of finance for the payments are debt swaps, the sale of carbon offsets, and any profits from bioprospecting deals with pharmaceutical companies. In 1996, about \$66 million was raised by the ecotax, making \$22 million available for the payments to forest owners. However, Costa Rica entered a macro-economic crisis, there was a change of government, and the money was not initially released by the Finance Minister in spite of protests from environmental lobbies.

Sources: Stuart & Moura Costa, 1998; Heindrichs, 1997; J. Davies, pers. comm.

through fiscal 'market-based instruments' discussed in Section 3, and/or regulation which effectively restricts the freedom to pursue short-term profit objectives. Failure to intervene to close the gap between private and social returns is a major aspect of policy failure.

The initial conclusion is that the central challenge for IFIMs is to find ways of modifying market incentives by tackling market and policy failures so that sustainable forestry becomes more attractive than alternative land uses. This can result either from improving returns to long-term forestry, or by reducing the profitability of alternative land uses, i.e. reducing the opportunity cost of sustainable forestry.

3. DOMESTIC FISCAL MARKET-BASED INSTRUMENTS AND SUBSIDIES

3.1 'Polluter or beneficiary pays' fiscal transfers to forestry

'Polluter or beneficiary pays' taxes in a forestry context are based on the concept that those causing environmental and social costs incurred by others, for example through unsustainable logging, should pay taxes or charges which increase the (private) costs of their actions, and that 'downstream' beneficiaries should compensate upstream forest managers for the benefits provided. This type of

fiscal mechanism, whether it is a tax or subsidy, is termed a 'market-based instrument' (MBI). The main principle of MBIs is that they 'internalise' social costs and benefits into private returns, and this should cause people to modify their economic behaviour. Fiscal MBIs can have a 'double-dividend' since the revenue collected can be used to encourage environmentally compensating activities.

There is nothing particularly new about the use of MBIs to encourage forestry: charging water users to compensate upstream landowners has been used successfully in Japan for over 100 years (McGaughey and Gregersen, 1988). Colombia has imposed polluter and beneficiary pays charges since 1974, and significant sums have been raised; \$150 million was recently transferred from electricity companies to regional environmental authorities for reforestation and watershed management (Gaviria, 1996). However there have been problems in assuring the money has been appropriately spent. Costa Rica plans to use 'polluter and beneficiary' taxes to make payments to forest owners prepared to commit themselves to NFM or conservation over a 20 year period (Box 3). Again it has been easier to raise the revenue than channel it into forestry.

The most common examples of 'beneficiary pays' taxes occur in the context of the benefits of watershed protection and eco-tourism. In Ecuador, a Watershed Protection

Fund has been recently established by the Quito municipal government with the support of The Nature Conservancy (Moura Costa et al., 1999). Funding, which is being particularly used for reforestation, comes from water charges levied on electricity companies, private water users and the public water authority. There are other significant examples from Colombia, Indonesia, China and Costa Rica (Box 3). In Belize, the Protected Area Conservation Trust has been funded partly by a \$3.75 tourist conservation fee paid by about 140,000 foreign tourists per annum. User fees are another important MBI: in Nepal, an entrance fee of \$12 per person to the Annapurna Conservation Area has been enough to support the protected area as well as local development projects (Preston, 1997).

3.2 Differential land use taxes, ecological VAT and other MBIs

Differential land use taxation

The aim here is to introduce (or adjust) land use taxes which reflect the non-market benefits and costs stemming from different land uses, and encourage users to move towards more sustainable resource management. Land taxes and capital gains taxes, can also potentially discourage deforestation linked to land speculation by raising the cost of holding land as a hedge against inflation or as a source of capital gains (Kaimowitz et al., 1998). A rare documented case of differential land use taxation is presented in Box 4, which describes how a differentiated tax regime has apparently induced more sustainable management of fuelwood resources in Niger's savannah woodland.

The tendency of land use taxes, where they exist, has unfortunately been in the opposite direction; Brazil's Rural Land Tax, which is designed to stimulate rural productivity, was found by Almeida and Uhl (1995) to be light on ranching and encouraged deforestation. This source argues that the tax could be modified to give discounts to loggers, ranchers and farmers who attempt more sustainable management, and that untouched forest areas should be exempt. They suggest that global positioning systems and geographic information systems would allow local government to monitor land use change in a cost-effective manner on a property-by-property basis. However, few countries have tried land or capital gains taxes due to the large amounts of information required, the high potential for evasion and the likely political opposition (Kaimowitz et al., 1998).

Brazil's ecological VAT

Another fiscal mechanism with some MBI characteristics is the Brazilian 'ecological' value-added tax (VAT) introduced into four States since 1992 following state legislation to re-allocate VAT according to environmental criteria. The ecological VAT is distributed to municipalities according to the extent to which they restrict land uses in favour of conservation and water protection (Seroa de Motta et al., 1997). For example, in the case of Parana State 1.25% of VAT has been distributed to some 112

municipalities protecting forests or water. The mechanism explicitly recognises the need to compensate municipalities for foregone income, and payments are linked to well-publicised environmental performance indicators, making it an MBI. Large increases in 'compensation areas' and municipality revenues have been reported by Seroa de Motta et al. (1997). This is a case of an innovative use of a traditional fiscal instrument, rather than an innovative financial instrument - it is therefore less demanding in terms of the political will required.

Why have fiscal MBIs not been used more?

The reasons why fiscal MBIs have not been used more include their political unpopularity with urban electorates, fears of reduced competitiveness and increased unemployment, and their high information requirements. For MBIs to be set correctly to be effective and equitable, research is needed on the difference between the private and social costs of the different winners and losers, and on the marginal costs of the resource users (Markandya, 1997). They also demand considerable administrative capacity - including monitoring, enforcement/collection and the need for wide public consultation prior to their introduction.

Unfortunately MBIs have often been set too low, possibly due to political resistance and lack of research, but also due to a confusion between the incentive and revenue objectives. An incompatibility of these objectives is pointed out by Karsenty (1998): in order to achieve an environmental impact by correcting economic behaviour, the charge needs to be set at a high enough level and be narrowly targeted, whereas for revenue generation a lower charge and broad tax base is better. MBIs have tended only to achieve revenue generation objectives (Seroa de Motta et al., 1997).

3.3 Forest pricing

For state-owned or managed forest, the most important financial incentive mechanism is forest pricing or the setting of forest fees. Forest fees are another type of MBI, and are the subject of a voluminous literature (e.g. Grut et al., 1991; Repetto, 1988; Karsenty, 1998), but space limits us to a brief discussion, except for two of the more 'innovative' mechanisms.

Forest fees send out powerful signals to forest users about the scarcity of the resource. When timber is underpriced by the state, forests have less value and the tendency is to use or waste more timber than other relatively more expensive inputs. Weak control encourages concessionaires to exploit a forest area and move on to the next one, since the opportunity cost (cheap timber elsewhere) of staying on is prohibitive. Low royalties, concession fees and export levies also result in low government 'rent recovery', an often massive transfer of wealth from the public to private sector in the form of 'unearned rent', and the encouragement of rent-seeking behaviour. Loss of rent also occurs as a result of illegal logging, inefficient collection, transfer pricing, smuggling and tax evasion. Forest revenue

Box 4. Differential taxation in Niger savannah woodland

A differentiated fee structure was introduced in the World Bank-supported (since 1989) Niger Household Energy Project in a situation in which urban fuelwood traders had previously had untaxed access to the resource. The project introduced a tax system which taxed urban fuelwood supplies from controlled rural markets at a much lower rate than supplies from open woodland. The system guides collectors to areas where fuelwood is available at a lower extraction cost and capable of being produced more sustainably. A colour code system delineates the areas: no collection is allowed in degraded *red* areas; limited collection on the payment of a higher tax level is allowed in well-stocked but distant *yellow* areas that are unlikely to be managed sustainably due to the low stumpage values; and in *green* areas with higher stumpage values closer to the villages, users have to sign long-term management agreements but pay lower tax levels. The tax is administered by the Forestry Department.

Communities in the area have also been given formal rights to manage their local areas of natural woodland and exclusive rights to sell all the fuelwood produced through the rural markets, provided they abide by the management agreements. By the end of 1995, some 85 village fuelwood markets had been set up supplying about 16% of urban fuelwood needs.

It is reported that the project has generated additional revenue for local and state government, raised income for local communities (about half the tax levied in green zones goes to a village committee to decide how best to spend it), and provided appropriate incentives for traders and communities. The incentives for the communities include maintaining prices (keeping the traders out of red zones suppresses fuelwood supply) as well as the tax revenue and environmental benefits. At the same time, effective enforcement and tax collection have proved difficult in the face of opposition by the traders, and the system is described as 'institutionally fragile'.

Sources: Foley et al. (1997); Crossley et al. (1996)

is usually collected by the Treasury, and only rarely channelled back into the forestry sector.

Low log prices can also be caused by log export bans or other trade restrictions, and theory suggests that this encourages over-exploitation and inefficient processing (Barbier et al., 1994b). However in many countries, vertical integration of logging and milling means that this effect may be negligible. Also econometric evidence indicates that lower log prices result in less logging, and that the link between trade restrictions and inefficient processing is unproven (D.Kaimowitz, pers. comm.). On the other hand, low timber values contribute to deforestation by reducing efforts to deter encroachment by farmers into concession areas (Kaimowitz and Angelsen, 1998). What is less contested is that the use of high export levies or export bans to stimulate industry (via cheap timber) has been at a high social cost and resulted in 'negative value-added' in the industry (Karsenty, 1998). A promising approach to regulating log exports in a less distorting way is to auction log export permits, if auctioning can be effectively implemented (see below), since this would allow forest managers to make a choice.

Bidding for forest concessions

Forest prices can be set by regulation (administered prices) or by the market. The former usually results in underpricing. Many (Grut et al., 1991, Gray, 1997) argue that area-based fees, like concession rent, are preferable to volume-based royalties, since the latter take no account of the future and encourage over-exploitation of accessible stands, while the former tend to better reflect the value of concessions, and are easier to implement and collect.

Recent evidence from Bolivia and Cameroon shows, however, that unless the movement of timber is closely controlled, higher area-based fees can cause timber companies to opt for smaller concessions and switch to 'informal sources' of timber (D. Kaimowitz, pers. comm.).

Competitive bidding for forest concessions is widely regarded as the most effective means of increasing rent recovery and providing appropriate incentives. Some countries have tried concession bidding, including Cameroon, Venezuela, Malaysia and Honduras; in the latter case, forest revenue increased up to tenfold per hectare after auctions were introduced in 1995 (WFSCD, 1997). There are a number of preconditions and potential problems associated with a bidding system, and these have constrained progress:

- good and transparent information: a good forest inventory is essential;
- pre-qualification of bidders in terms of their technical capacity;
- sufficient competent bidders to make the auction competitive, and the absence of collusion;
- the question of whether to limit bidding to national companies, involving a trade-off between revenue and national sovereignty concerns.

There are a number of possible variations on concession bidding. These include competitive bidding on the annual rental of forest concessions as proposed for the privatisation of some state forests in West Africa (Bass and Hearne, 1997), and bidding for performance bonds (see below). Competitively-bid concessions should also

be marketable, although any buyer would need to be technically competent (Gillis, 1990).

Performance bonds

Performance bonds, which are based on the ‘polluter pays’ principle, appear to have considerable potential, but there is significantly no example of their effective implementation. They involve the concessionaire depositing a refundable lump sum or bond at the beginning of the concession in an account of the Forestry Department (FD), which would make regular field inspections and gradually return the value of the bond, and any interest, to the concessionaire providing good practice is followed. The level of interest could be made higher if special funding to reward NFM is made available from the international community (D’Silva and Appanah, 1993). Refunding at regular maturity intervals would start some years after the initial harvest and end with the full production cycle. Any fines for poor performance would be deducted from the deposit.

The key importance of performance bonds, which it is claimed have been successfully applied in the mining sector (Douglas and Magrath, 1996), is that they can alter the incentive from short-term exploitation to longer term forest management, and thus overcome the ‘bogey’ time or discounting problem for forestry (see Box 1). Figure 1 illustrates how performance bonds can change the underlying incentives. Under normal conditions, the net present value (NPV) of logging a new area is much higher than the NPV of a second harvest on an existing forest area in 30 to 40 years’ time. By ensuring concessionaires receive their income gradually and towards the end of the felling cycle, it brings the return from logging a new area, also subject to the bond, roughly into line with the NPV of a second harvest. This greatly reduces the opportunity cost of staying on for a second cut.

The lack of experience with performance bonds indicates the presence of serious constraints to their implementation.

Firstly, deciding the level of the bond is difficult. It is essential that the bond is set sufficiently high: otherwise, it will not sufficiently lower the opportunity cost of waiting for a second cut, and the concessionaire’s preference will be to forfeit the bond and move to another area. However it should not be set so high to cause potential concessionaires to take their capital out of forestry completely. The size of the bond could be fixed according to estimated profitability or determined by bidding (D’Silva and Appanah, 1993). They should be accompanied by only minimum royalties, and zoning of conservation areas with high non-market values (Speechly, 1996). Some analysts also argue that longer concession tenure is an essential complement to performance bonds (Mansley, 1996), but the evidence for this is unconvincing (see 7.4).

The performance bond approach has been partially implemented with limited success in Malaysia, Indonesia the Philippines (Moura Costa et al., 1999). In the Philippines, information prior to bidding was poor, royalties were raised by 2500%, and revenue has not been recycled to strengthen the monitoring system and for zoning conservation areas, so that it has not been an effective pilot (Speechly, 1996). As with other approaches to NFM, effective implementation of performance bonds involves overcoming negative or corrupt public sector attitudes, while performance evaluation faces technical and definitional problems.

3.4 Subsidies for tree planting

There is also a large literature on the experience of using fiscal subsidies or subsidised credit to encourage plantations or small farmer tree planting (e.g. McGaughey and Gregersen, 1988; IDB, 1995). Since it is not innovative, this approach is only briefly reported here. For fiscal transfers from the public to private sector to be justified, two conditions should hold: that tree planting is not commercially attractive in its own right, and that

Box 5. Subsidies for small farmer tree planting

Subsidies usually involve free or cheap planting stock, cash payments to offset establishment and maintenance costs, or cheap credit. But tree planting requires only low inputs of capital, and planting cost is not usually the main constraint. The reasons why farmers plant trees are more often associated with their relative resource endowments. They are often more interested in trees when they have reasonably abundant land and off-farm income but little labour, since trees give high returns to small amounts of labour; also, with sufficient income from non-farm sources, there is less need for intensive farming. Secondly, subsidising tree-planting may promote an activity which is not viable, is environmentally detrimental or does not respond to longer term livelihood requirements. Persuading farmers to plant trees for the ‘wrong’ reasons - like accessing credit - can distort land uses, threaten household food security or cause inequity through displacement of sharecroppers and grazing, as has happened on some Indian projects. Subsidised inputs also discourage local production of those inputs. A more effective approach to encouraging small farmers to plant trees is to tackle demand constraints, including policy failure problems like price controls and bureaucratic marketing regulations involving harvesting, transport or sale permits. Outgrower schemes have also proved an important means of reducing market uncertainty, and represent an increasingly important IFIM for small farmer tree planting.

Source: Arnold and Dewees, 1997

public good values are higher than in alternative land uses. The evidence suggests widespread use of subsidies when neither of these conditions have held (Keipi, 1997). A second problem has been the encouragement, in some instances, of a land use with lower public good values than the land use (often degraded natural forest) being replaced, for example in Brazil and Costa Rica (McGaughey and Gregersen, 1988, Morrell, 1997).

Using fiscal incentives for tree planting has also sometimes proved inequitable. Seedling distribution and cash subsidies have often been targeted to larger farmers or companies, because this enables the FD to reach its targets quickly and with the minimum number of transactions (Arnold and Dewees, 1997). Smaller farmers have sometimes not qualified for the incentives since they do not pay taxes or possess property titles (Keipi, 1997). Box 5 discusses the particular problems of persuading small farmers to plant trees. Subsidised credit, usually aimed at small farmers, has run up against similar problems. The high administrative costs and lender risks associated with small farmers, lack of collateral, and burdensome information requirements of lenders (McGaughey and Gregersen, 1988) have resulted in a view that conventional financial institutions are inappropriate for small farmers or rural communities (see 6.1).

The IDB (1995) view that it is best to avoid subsidies due to the distortions they create seems to ignore their potential to build up the institutional basis for the longer-term development of the sector. In spite of the mixed experience with plantation subsidies, it is doubtful whether without them strong plantation sectors would have developed in Chile, Costa Rica and several other Latin American and Asian countries. In Costa Rica,

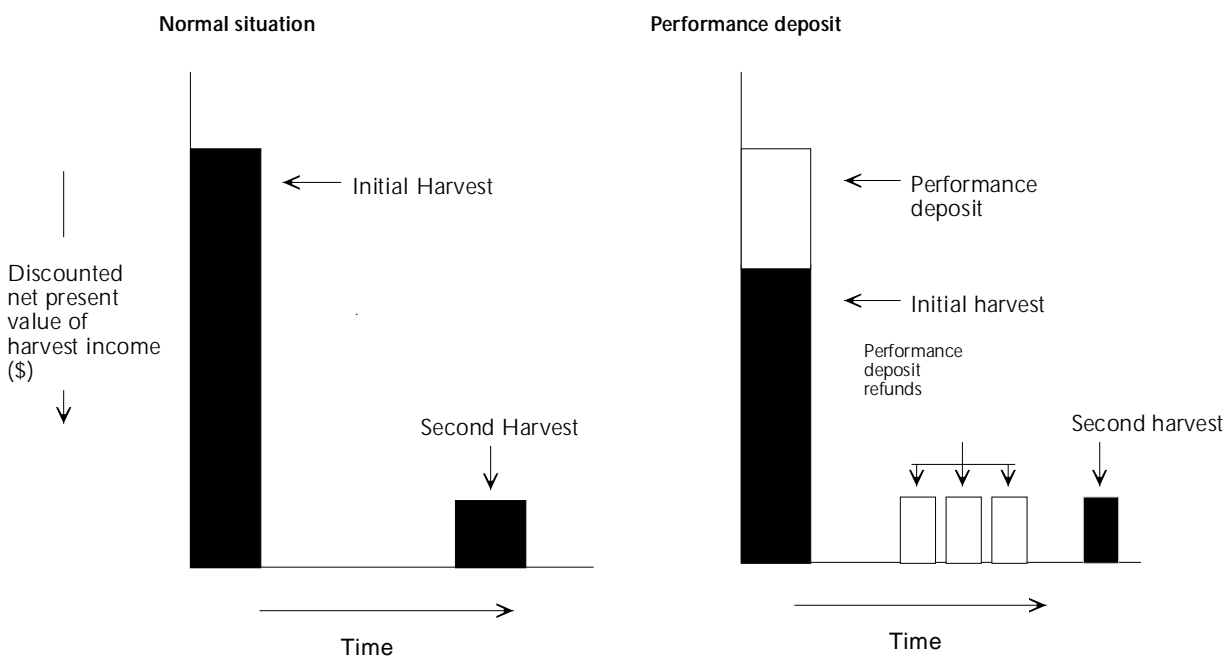
subsidies for plantation development have greatly facilitated the development of expertise and technical knowledge in the forestry sector, and it can be argued that, ten years on, this provided the institutional and technical basis for being able to encourage small farmers to engage in NFM and conservation (Richards et al., 1996). The country's National Campesino Forestry Assembly (JUNAFORCA), which now plays a major role in promoting forestry among small farmers, was developed on the basis of subsidies (D. Kaimowitz, pers. comm.). In Panama, 100% tax exemption was given for both domestic and foreign plantation investors; from 1992 to 1995, \$30 million was attracted for reforestation projects, and several companies created businesses selling stocks, bonds and reforested land (Joshi, 1998).

4. INTERNATIONAL TRANSFER PAYMENTS

4.1 Debt-for-nature swaps

'International transfer payment' is a rather generic term which implies a (non-market) transfer of financial resources from consumer nations in recognition of the global public good values of forests, and does not restrict itself to fiscal approaches. Debt-for-nature swaps (or debt swaps for short) involve an agreement between a donor or environmental Non-Governmental Organisation (NGO) and a debtor country for the cancellation of debt in exchange for environmental commitments by the debtor country. They indicate a demand or willingness to pay for biodiversity conservation by the international community, and more specifically by those contributing to international NGOs like the World Wide Fund for nature (WWF) and Conservation International.

Figure 1. Financial returns under performance bonds compared to normal practice



Source: Jay Blakeney in D'Silva and Appanah (1993)

The first debt swap took place in 1987 between Conservation International and the Government of Bolivia. For writing off \$650,000 debt, the latter committed \$100,000 for the protection of Beni Biosphere Reserve. But controversy, delays and disagreements marred the experience (Resor, 1997). Gradually the international NGOs and bilateral donors learned from such mistakes: the 1987 and 1989 swaps involving the Government of Ecuador, a local NGO (Fundación Natura), WWF and Nature Conservancy proved much more successful, resulting in a \$10 million conservation programme and the setting up of an endowment fund. By 1997, about \$130 million had been generated in funds for conservation (Resor, 1997).

There have been less opportunities for debt swaps in the mid and late 1990s, partly because there has been less aid available to help purchase them, and due to lower discounts on debt purchase. However there may be potential for tapping into multilateral development bank debts (Resor, 1997). A recent boost has been approval by the US Congress of the Debt Reduction for Developing Countries with Tropical Forests Act (Moura Costa et al., 1999). As usual debt can be purchased by third parties, and debtor countries have to make forestry commitments. These include establishing a 'tropical forest fund' in the local currency, setting up a forest protection 'board', and putting in place 'major investment reforms'. Eligibility criteria for Latin American and Caribbean countries are listed. An interesting variation on debt swaps has been suggested by COICA (Coordinating Body of Indigenous People's Organization of the Amazon Basin): 'debt-for-indigenous-territory-swaps' in which national governments agree to restore and protect indigenous land rights in return for debt reductions.

Resor (1997) claims that debt swaps have facilitated conservation programmes with long-term time horizons, but also points out how problems of the organisational capacity and strategic planning of conservation organisations, combined with an unstable political and economic situation, have resulted in high transaction costs and reduced effectiveness. As with other IFIMs which are not market-based, there is no guarantee that the money will be used effectively (e.g. all the proceeds of a \$2.2 million swap with Zambia were spent in a year as a result of devaluation and poor planning). Also, as with any IFIM, effectiveness depends on policies, institutions, information, technology, etc.; the relative success of Costa Rica in using debt swaps has been due to a more favourable policy environment, institutional and administrative capacity, well-trained foresters, etc. (J. Davies, pers. comm.).

Critics of debt swaps (Anderson, 1994; Katzam and Cale, 1990) say that purchasing second-hand debt increases the price of remaining debt and the macro-economic burden for debtors, and therefore the pressure on remaining natural resources; but it is not clear how significant this effect is, and the latter causal link is weak (Kaimowitz and Angelsen, 1998). Other criticisms like the lack of local

participation in land use decision-making, and inequitable tenure decisions in the development of protected areas, are generic and could apply to almost any general source of finance.

4.2 The Global Environment Fund

The Global Environment Fund (GEF) was set up in 1991 on the basis of a multilateral trust fund of \$1.3 billion with the objective of funding projects which protect the global environment (OECD, 1995). The GEF⁸ is jointly managed by UNDP, UNEP and the World Bank, who respond to the GEF Council, which is divided equally between the bilateral contributors and developing country/transitional economy representatives. It is responsible for the financial implementation of the International Conventions on Climate Change and Biological Diversity. The latter Convention (Art. 20) obliges developed countries to provide 'new and additional financial resources' to allow developing countries to meet the 'agreed full incremental costs' of meeting their obligations under the Convention. Article 21 identifies the GEF as an appropriate financial mechanism.

One of the problems for the GEF has been the interpretation and measurement of 'incremental cost'. This is supposedly the additional cost incurred in safeguarding global as opposed to domestic public good benefits. Apart from the intractable definitional and practical measurement problems, there has been the contentious issue as to whether the incremental cost should be gross or net of domestic benefits - the latter is clearly much lower (OECD, 1995). In spite of these problems, the GEF provided some \$2.8 billion over the 1991-96 period, representing 20% of the total costs of 'global benefit' projects in developing countries, about half of which have involved biodiversity conservation (Panayotou, 1997a). As with debt swaps, the GEF has been used as a leverage for private sector financing; by putting small amounts into venture capital funds, GEF funds have generated between five and 20 times more equity finance (Panayotou, 1997a). Some \$2 billion has been pledged to GEF-2 for the 1998-2002 period.

Two recent evaluations of the GEF, one by insiders and one by outside consultants, report that the emphasis has been on conservation rather than sustainable resource use; biodiversity projects have suffered from some basic flaws, including the tendency to take an over-scientific approach and exclude local people; a focus on government institutions rather than NGOs or grass-roots organizations; and poor targeting of ecosystems and species of global importance (Edwards and Kumar, 1998). The GEF has also failed to 'green' donors and multilaterals involved in environmentally degrading development projects. A further objection to the GEF is that the 'donor club' determines the priorities with members of the GEF Council competing for funds (Anderson, 1994). This is

⁸ A more detailed analysis of GEF can be found in Moura Costa et al. (1999).

one problem of a donations-based as opposed to a market-based approach.

4.3 National Environmental Funds

The term National Environmental Fund (NEF) covers conservation trust funds, endowments, green funds, etc. (OECD, 1995). NEFs are included here as they are an important financing vehicle for funds raised through international transfer payments. They are designed to collect earmarked revenues and disburse them for environmental and conservation purposes. NEFs usually operate on the basis of a capital endowment fund which generates interest for financing environmental activities. Most Latin American countries now have some kind of trust fund, while Indonesia built up a reserve of more than \$700 million in its National Reforestation Fund from a 32% share of forest fees (Joshi, 1998). An equivalent suggestion at the international level is the 'International Rainforest Fund' proposed by the United Nations Environment Programme (UNEP) based on a charge proportionate to the Gross National Product of each country (Barbier et al., 1994b).

Since the beginning of the 1990s, NEFs have been set up in about 20 tropical countries and almost all the transitional economies of Eastern Europe, mainly on the basis of debt swaps, GEF contributions and other multilateral and bilateral aid funds (Panayotou, 1997a). For example, the \$20 million Bhutan Trust Fund was set up with contributions from GEF, WWF, and three European donors, while the Colombian ECOFONDO (Ecofund) was established on the basis of debt swaps with the US and Canada (Resor, 1997). This international finance has exerted considerable leverage on additional public and private sector funds (Panayotou, 1997a). Innovative domestic funding methods have sometimes also been used to supplement external finance, as in the case of a tourist tax in Belize, and a tax on airline tickets in Algeria.

NEFs are more developed in Eastern European transition economies, where there has been more emphasis on using MBIs like 'polluter pays' taxes to fund them. A successful and innovative variation of an NEF is the Polish Environmental Protection Bank, which makes loans to ecological projects in which the difference between commercial and 'preferential' interest rates (allowing for public good benefits) is covered from a national fund set up with a debt swap (Crossley et al., 1996).

NEFs have been criticised on the grounds of economic efficiency - the guaranteed sources of finance can result in wasteful management and poor expenditure choices, for example by following specialist or narrow environmental interests rather than national priorities (Pearce et al., 1997). To counter this, OECD (1995) think NEFs 'should focus on addressing the specific market and institutional failures that hinder environmental investment.'

4.4 Taxing the international tropical timber trade

Taxing the tropical timber trade, or redirecting existing taxes, so that a transfer is made from consumer to producer countries, has several attractions (Barbier et al., 1994b; Anderson, 1994):

- it has a high revenue generation potential;
- unlike GEF and debt swaps, it would not divert aid from alternative development;
- it would alleviate the problem of low rent capture by producer country governments;
- it would be progressive.

One suggestion is to reduce VAT on tropical timber imports by industrialised countries while leaving producer margins and consumer prices unchanged. Barbier et al. (1994b) calculate that if VAT on timber imports were halved (from 15% to 7.5%), this could raise \$1.5 billion per annum and forest rent recovery in producer countries would rise by 30-80%. However the estimated loss in revenue to consumer countries (\$3.7 billion) is much more than the revenue gain by producer countries (the difference is due to 'leakages' to other sectors in the tropical timber trade) and it would be more efficient to transfer the VAT collected. Whichever way there are serious political objections, including the sensitive issue of consumer nations wanting to monitor how the money is spent (Barbier et al., 1994b). A study by the Netherlands Economic Institute indicated that a 1-3% import surcharge on tropical timber imports to the EU, Japan and US would raise \$31-94 million with few distorting effects. If endorsed by ITTO, it would be within GATT rules. An export levy would be more difficult to implement, raise less revenue and would need to be applied to all producer countries simultaneously (Barbier et al., 1994b).

4.5 'Area-dependent payments' to forest management units

A suggested mechanism for channelling international transfer payments to NFM, and which has been particularly linked to timber trade taxation, is to make area-dependent payments to forest management units to compensate the additional costs of NFM (Bach and Gram, 1996). This idea is based partly on recent EU Common Agricultural Policy reform in favour of area-dependent payments for farmers. Payment would be for the costs of forest planning, inventories, silviculture, proper road construction, and monitoring systems. Most of these costs occur at the beginning of the production cycle, and with normal discount rates there are serious disincentives to invest in them. For Ghana, a figure of \$100 per hectare was calculated, while the estimated global cost was \$2.25 billion per year (Bach and Gram, 1996). These authors propose that the resources could be transferred via a

rehabilitated Tropical Forestry Action Plan, and that ITTO and IUCN could monitor the effectiveness of the payments.

4.6 Other international taxes

Many forms of international taxation have been proposed to help finance biodiversity conservation (in particular). For example, the 1980 Brandt Report (quoted in Anderson, 1994) observed that ‘various proposals to raise the international revenues have been outlined in recent years. These include placing a levy on international trade, on the arms trade, on international investment, on hydrocarbons and exhaustible minerals, on durable luxury goods, on military spending, on the consumption of energy, on internationally traded crude oil, on international air travel and freight transport, or on the use of the ‘international commons’ - ocean fishing, offshore oil and gas, sea-bed mining, the use of space orbits, radio and telecommunication frequencies and channels.’ Thus although ‘innovative’, such proposals are certainly not new. Arguably three types of tax have received most attention:

- the Tobin tax on international foreign exchange transactions;
- carbon taxes;
- air travel taxes.

The Tobin tax would probably raise most money⁹ and discourage destabilising speculative currency transactions, but is not an MBI and would therefore not result in direct environmental benefits; carbon taxes would have the biggest environmental impact, but would be more regressive; while the air travel tax would be most progressive and also be environmentally beneficial, but would generate least revenue of the three options. National carbon taxes already exist, and are bound to increase as countries seek ways to meet their Kyoto commitments, but are less likely to be introduced at the international level. Until there is some kind of global governance system, international taxes - which would need to be applied on a multilateral basis - are unlikely to go beyond the drawing board. A survey in industrialised countries found that 70-90% of respondents favoured giving money to an environmental agency over an international tax (Panayotou, 1997a).

5. MARKET APPROACHES BASED ON PUBLIC GOOD BENEFITS

‘Carbon offsets promote the transfer of funds from industrialised countries to tropical countries as a commercial transaction, based on global sharing of the financial burden of environmental protection, as opposed to charity’ (Stuart and Moura Costa, 1998: 63)

5.1 Carbon offset trading

Forestry-based carbon offset trading, or carbon trading for short, is the IFIM most in the limelight since it is linked to the progress of international discussions on climate mitigation measures. It involves a company or country which emits CO₂ paying forest owners or users in the same or other countries for a compensating absorption (carbon sequestration through growing trees) or reduction in CO₂ release from existing vegetation. Joint Implementation¹⁰, involving carbon trading between two countries with the intention of achieving cost-effective reductions in greenhouse gases, was first encouraged by the 1992 UN Framework Convention on Climate Change (FCCC). Carbon trading potentially allows tropical countries to take advantage of their comparative advantage in providing an environmental service (mitigating the release of greenhouse gases) to industrial societies (Stuart and Moura Costa, 1998).

Forestry-based carbon offset deals can result in ‘positive carbon flows’ in either of two main ways:

- by the active absorption of carbon dioxide through biomass growth: this is sometimes referred to as the ‘gross emission mitigation’ approach, and involves both ‘sink creation’ (afforestation, reforestation, and on-farm tree planting) and ‘sink enhancement’ (increasing growth rates of existing forests through silvicultural actions) activities;
- by reducing the amount of carbon released from existing vegetation, for example due to fire and decomposition: deforestation contributes an estimated 30% of current global anthropogenic CO₂ emissions, while substantial amounts of carbon are also stored in the soil, so management practices which promote an increase in soil organic matter are also significant (Stuart and Moura Costa, 1998). In this ‘net emission mitigation’ approach, ‘with project’ carbon emissions have to be compared to ‘without project’ or ‘baseline’ carbon emissions.

In either case forestry acts as a ‘sink’ for carbon dioxide, as distinct to a ‘reservoir’ in which forests are in carbon balance. Thus carbon offset deals could involve NFM (e.g. low impact logging), improved processing efficiency, improved fire control, buffer zone agriculture that reduces pressures on primary forest, and conservation projects. The possibility of policy improvements to reduce deforestation has also been mentioned but seems unlikely in view of the measurement and compliance problems. Forest conservation is reported to be the most cost-effective and quickest (forestry) means of achieving carbon emission mitigation (Stuart and Moura Costa, 1998), while planted trees involve far less measurement and enforcement problems (see below).

⁹ It has been estimated that a charge of 0.25% on all foreign exchange transactions could raise \$140 billion annually (Panayotou, 1997a).

¹⁰ The 1997 Kyoto Protocol narrowed the definition of ‘joint implementation’ to climate change mitigation projects between two OECD Annex B (industrialised/transitional economy) countries.

The case for carbon offset trading

By simultaneously meeting environmental and economic objectives, carbon trading has been described as a win-win development (Pearce, 1996). This optimism is based on the accelerating political process of establishing binding carbon emission limits, and therefore the increasing national self-interest in identifying cost-effective ways of mitigating carbon release; the mainly positive experiences to date, particularly in Costa Rica; and its apparently favourable economics. Specifically:

- tropical forestry, with lower land and labour costs and higher biomass growth rates than temperate forestry, represents the cheapest way of reducing CO₂ (if scientific uncertainties are disregarded); the current cost of tropical forestry carbon offsets ranges from \$2 to \$10 per tonne of carbon (tC) (Stuart and Moura Costa, 1998), while the average fuel switching cost has been reported at \$137/tC (Pearce and Bello, 1998)¹¹ in comparison with an estimated marginal cost of damage from climate change of \$25-30/tC (from a cost-benefit viewpoint there is little point in carbon emission mitigation if it costs more than this);
- it gives public good value to the forests, these values are paid for by the polluters in the form of a market-based international transfer payment and internalised by forest users including local or forest-dependent peoples;
- for purchasers, it provides good public relations value, and for sellers it ensures early financial returns and, associated with certification, can improve market access;
- international regulation should eventually result in a tradeable permit market in which a country using less than its emissions limit can sell its surplus to countries emitting more than their quotas, while the latter could increase their quotas by financing carbon offsets in credit countries, and the profits from trading could be used to finance forest protection (Chandrasekhran, 1996);
- if tropical countries become subject to carbon emission quotas, credits for greenhouse gas reduction could be shared between the supplier and purchaser countries, providing an additional incentive to supply (Pearce et al., 1998);

Box 6. The Kyoto Protocol and the Clean Development Mechanism (CDM)

At the Third Conference of the Parties (CoP3) to the FCCC in November 1997, a set of nationally differentiated emission targets were agreed, subject to ratification, for industrialised and transitional economies (OECD Annex B countries) for the first (2008-2012) commitment period. Signatory nations to the Kyoto Protocol agreed to reduce greenhouse gas emissions to an overall average level 6% below 1990 levels by the 2008-2012 period.

The CDM was established by Article 12 of the Kyoto Protocol and refers to climate change mitigation projects undertaken between capped Annex B countries and non-Annex B (developing) countries. The CDM will act as an international regulating body to oversee emission reduction projects by either public or private entities in developing countries. The new mechanism (resembling JI) allows (again subject to ratification) 'Certified Emission Reductions' to be banked from the year 2000, eight years before the first reporting period. There is an incentive to obtain these credits before 2008, since each year of emission reductions will increase the transaction value of the credit. Kyoto also established QUELRO (Quantified Emission Limitation and Reduction Obligations) trading in which capped Annex B countries below their quotas can sell surplus 'allowances' to debit countries.

Article 3, covering JI between Annex B countries, approved 'net emission' projects which reduce the net rate of carbon release (*viz* forest conservation, fire control, etc.), but neither 'sinks' or 'forestry' were defined or even mentioned in Article 12, giving rise to great uncertainty about the probability of inclusion of forestry-based offsets in the CDM. While the Protocol has been *signed* by the requisite number of countries, it will only take effect 90 days after the 55th country *ratifies* it. Without ratification, it remains "nothing more than a promising and highly symbolic first step" (Stuart and Moura Costa, 1998:12). The main stumbling block may be the US Congress, although the US *signed* it at the November 1998 Buenos Aires Conference of the Parties (CoP4). Due to economic competitiveness, it is unlikely that many industrial countries will ratify it until the US does. The CDM also remains poorly defined on many issues, and governments and other interest groups hold different interpretations of it. It will require complex international negotiations as well as domestic legislation for the gaps to be filled in.

Source: Stuart and Moura Costa, 1998

¹¹ However it should be pointed out that (a) the carbon offset cost is based only on the supply cost, and future prices will increasingly include a demand-price element - the US Administration recently quoted \$14-23 per tC (Pearce et al., 1998) and the World Bank \$20-25 per tC (Stuart & Moura Costa, 1998); and (b) since forestry-based emissions are not permanent, they will receive less credit than fuel switching.

- as carbon taxes are introduced, timber products will be preferred to higher energy/cost building materials like concrete, steel and aluminium, and this will also contribute to meeting emission reduction targets (Brand, 1998);
- as markets develop for verifiable greenhouse gas commodities, a range of structured financial investment instruments should evolve (Moura Costa and Stuart, 1998).

Carbon trading holds several key economic advantages for forestry, especially in comparison to timber production (Price, 1996):

- benefits occur from the first year and are continuous;
- there are no transport costs, so stumpage value is not dependent on location;
- the product (carbon sequestered) is compatible with the capital (the tree); and
- value is not dependent on wood quality.¹²

The evolution of carbon offset trading

Progress has been rapid since the 1992 Earth Summit at which countries were encouraged to set up voluntary carbon trading projects in what was then called Joint Implementation (JI). To date more than 25 forestry-based

carbon offset projects in 15 countries have been funded through joint implementation mechanisms (Moura Costa et al., 1999). The US, Australia and Canada were the first to start JI offices; now the Dutch, Japanese and Germans have become active. For example, the Dutch have promoted a major programme called FACE (Forests Absorbing Carbon Emissions) with funding provided by a 1 guilder (\$0.55) annual tax on electricity bills (another example of a polluter pays tax). Most of the early forestry-based carbon offset deals brought together North American electricity companies and Latin American reforestation schemes, often brokered by an NGO or multilateral agency.

Article 12 of the Kyoto Protocol (Box 6) in December 1997 gave a major boost to carbon trading by establishing the Clean Development Mechanism (CDM); if Kyoto is ratified, it will be possible for carbon offset purchasers to build up credits to set against their future quotas from as early as January 2000, and it is estimated that the global market in emissions trading would be worth tens of billions of dollars annually within a decade (Moura Costa and Stuart, 1998). But there is continuing speculation over whether forestry will be included in the CDM given that it is not specifically mentioned in Article 12. In spite of this and doubts about ratification, there was a dramatic increase of interest in forestry-based carbon offset

Box 7. Costa Rica's experience with carbon trading

The CARFIX (Carbon Fixing) project was established in 1995 with the objectives of protecting carbon sinks in an important protected area, increasing carbon capture in the buffer zone, and providing investment opportunities for foreign investors and local landowners. The National Fund for Financing Forestry (FONAFIFO) was also set up to access non-government finance for the promotion of forestry activities in privately owned forests. This was followed in 1996 by creation of the semi-autonomous Costa Rican Office of Joint Implementation (OCIC).

With support from the Centre of Financial Products, the World Bank and the Earth Council, OCIC hopes to sell 'certified tradeable offsets' (CTOs) on the Chicago Stock Exchange. The first batch of CTOs was sold in 1996 (although not on the stock exchange) to a Norwegian Consortium for \$2 million (200,000 tonnes of carbon at \$10/tonne, equivalent to \$2.70/tonne CO₂). This was reinvested in the system to create the next supply of CTOs. OCIC plans to sell CTOs for 18 million tonnes of carbon to be retained through the Protected Areas Programme, which seeks to consolidate the protection of some 28 national parks covering some 570,000 ha. Implementation will be checked and certified by SGS Forestry. The net carbon sink effect will take into account a historical rate of deforestation of about 3%. CTO receipts will also be used to make environmental service payments to forest owners (see Box 3) and for various other environmental initiatives.

The Costa Rican experience provides an institutional model for carbon trading. FONAFIFO, which comes under the Ministry of Environment, receives and assesses project applications claiming carbon payments (in exchange for the transfer of carbon trading rights to the government), conducts field verification, makes the payments and monitors field implementation. These projects include pasture reforestation, buffer zone farming, NFM in primary and secondary forests, and measures to reduce illegal felling. FONAFIFO calculates the carbon fixing benefits from the projects and passes the figures to OCIC.

Sources: Heindrichs, 1997; Stuart and Moura Costa, 1998; Luzuriaga, 1997

¹² Although there is an important quality aspect in that carbon in different offset projects will be associated with different joint products like biodiversity conservation, and thus will attract different prices (Pearce et al., 1998).

projects in the first half of 1998. Some idea of Kyoto's impact is shown in figures provided by Moura Costa and Stuart (1998): based on the six months following Kyoto, they calculated an annual commitment rate of 14 new projects worth \$347 million, as against the previous highest annual commitment rate (in 1997) of four new projects worth less than \$5 million. This indicates a shift from voluntary 'good deeds' to national self-interest based on the expected advent of binding international regulations.

There are also some significant multilateral initiatives. In 1997, the World Bank set up the Carbon Investment Fund with an initial investment of \$150 million and was prepared to pay a much higher price (\$20-25 per tC) than previously. The Bank has also developed a sophisticated system for evaluating the benefits of carbon offset projects. The World Business Council for Sustainable Development has set up a type of clearing house for companies looking for carbon offset opportunities, and has received over 100 proposals (Stuart and Moura Costa, 1998).

At a national level, the most significant progress has been in Costa Rica, whose early experience with carbon offset trading is presented in Box 7. This shows that carbon trading by itself can attract international finance; the importance of appropriate institutions for carbon trading; and the potential for combining different forestry programmes (Stuart and Moura Costa, 1998).

Limitations and difficulties for carbon offset trading

The optimism for tropical forestry carbon offsets should be tempered by the political and technical complexities, including some unresolved questions as to whether forestry will be part of the CDM, the likely size of the market niche, and the impact of carbon trading on forest product prices.

Political and equity issues

There are two ways of looking at the motives of industrialised countries to engage in carbon trading. Is it investment in sustainable management and biodiversity conservation, or merely a way of avoiding their environmental responsibilities? There is a worry that carbon trading will act as a disincentive to the North to improve its pollution control, and represent another form of 'waste dumping' in the South - resulting in no overall net reduction in carbon release, and delays in the radical changes in consumption patterns needed. Southern countries have a number of other concerns about carbon trading, many of which raise politically sensitive issues capable of holding up international agreement, and it is significant that the industrialised countries are the principal supporters of forestry's inclusion in the CDM (McKenzie Hedger, 1998). These concerns include (Stuart and Moura Costa, 1998; Panayotou, 1997a):

- the best carbon reduction opportunities in the South are likely to be captured by Northern countries through the

CDM, so it will become more difficult and expensive for tropical countries to pursue their own carbon reduction programmes in the future;

- the implicit agreement of producer countries to surrender their carbon sink property rights;
- developing countries feel that for them to be subject to emission quotas would be historically unfair: not only have industrialised countries deforested without penalty - they also have more deforested land to reforest and earn credits;
- the fear that aid could become linked to performance on emission reductions, or that development aid would simply be substituted by 'emission reduction aid', thereby compromising a country's development priorities (the Southern view is that carbon offsets should be funded by the private sector);
- the concern that a country may sell the carbon sequestration services of state-owned forest at the cost of local users more in need of extractive products (although under sustainable management regimes, these should not be mutually exclusive objectives);
- low or zero profit margins for producers of carbon offsets due to the use (to date) of a supply price based on the marginal cost of supplying carbon sequestration services, reinforcing the notion that carbon offsets are only 'win-win' for industrial countries.¹³

There is also an equity problem within developing countries; the more progressive countries like Costa Rica, with more institutional and technical capacity, are likely to obtain the best deals and leave poorer countries behind. In fact the technical complexities of establishing a carbon offset regime present a major barrier to market entry for most developing countries (Stuart and Moura Costa, 1998). The advantages of being a market leader in what could become a major trade was an explicit motivation behind the Costa Rican initiative (Luzuriaga, 1997).

Many developing countries fear that their agreement to an emissions trading system will lead to mounting diplomatic and economic pressure to make them agree to their own emissions limits - strongly voiced by the US in Buenos Aires. CoP4 also revealed major differences in the stance of the US and the EU; the former favour more or less unfettered carbon trading, especially forestry offsets, as a means of combatting climate change, while the latter argue for limits on trading, emphasising the need for emission reductions at source (Tropical Timbers, 1998).

How cost-effective is it?

Many would contest the assertion that forestry-based carbon trading represents the most cost-effective means of reducing CO₂ in the atmosphere. First there is still major uncertainty as to whether carbon sequestration by trees will significantly affect climate change; one reason for this

¹³ An indication of the discrepancy is that the current price of carbon offsets is \$10-12/tC, suggested carbon taxes are upwards of \$25/tC, and carbon's social value has been estimated at anywhere between \$10 and \$1 million/tC, depending on the assumptions made! (Stuart and Moura Costa, 1998).

is that the role of the oceans in the carbon cycle is still poorly understood. Second, carbon sequestration by trees is not permanent. Forestry can only delay the release of carbon. Third, new energy technologies which reduce carbon emission at source, and at a lower cost than forestry, are likely to develop rapidly in the coming decades.

Will forestry be included in the CDM?

Forestry is not specifically included in Article 12 of the Kyoto Protocol, and there is no mention of land use change or biomass projects. However Article 6, which covers JI between Annex B countries, explicitly allows 'enhancing anthropogenic removals by sinks of greenhouse gases'. Article 3(3) further limits 'sink' activities to afforestation, reforestation and avoided deforestation since 1990. This wording has given rise to considerable speculation as to whether or not forestry will eventually be included in the CDM (Pearce et al., 1998). Discussions at Buenos Aires revealed that the complex and controversial forestry issues, largely avoided by officials at CoP4, will now be left until the IPCC has completed its special LUCF (Land-Use Change and Forestry) report in May 2000 (P. Moura Costa, pers. comm.). Controversy particularly surrounds accounting and compliance, the permanence of sequestration, and the 'eco-colonialism' issues. These problems mean that forestry is unlikely to feature in the first stages of the CDM, since the rules, structures and methodologies for implementing the CDM have to be finalised by CoP6 in October 2000.

Measurement, monitoring and enforcement problems

For the purchaser of carbon offsets, it is essential to be able to monitor and measure the net reduction in carbon emission, and to enforce the deals as necessary. The measurement problems for forestry stem from the fact that forests are both a source and sink for carbon. The measurement problems mainly revolve around calculation of the 'net emission effect'. This is the difference in carbon emissions over time between the 'project scenario' and the (without project) 'baseline scenario'. The definition of the baseline, and the mathematical assumptions about carbon loss without the project over time are vital: differences in the order of a single percentage point can halve or double the net effect of a given intervention over a 60 year period (Tipper and de Jong, 1998). Another measurement problem stems from Kyoto's 'additionality' principle: initiatives to mitigate greenhouse gas emissions must be able to show that their CO₂ benefits are additional to any that would have occurred with existing practices.

Most analysts favour 'full carbon accounting' over the current 'point of felling' calculations (McKenzie Hedger, 1998). Full carbon accounting has to take account of carbon fluxes over time, including previous land uses and how long carbon is fixed in the final product. Particular problems include how to measure changes in soil carbon, and the fact that different methods give different results. The calculations also need to take account of any

'leakage'. An example of *negative leakage* would be increased deforestation outside a conservation project area; this should be counteracted by, for example, intensifying agricultural production. An example of *positive leakage* would be a switch from consumption of fossil fuels to sustainable fuelwood as a result of an afforestation project (Pearce et al., 1998).

Compliance and monitoring costs of carbon offset projects are often cited as another important constraint, although in a recent case in the Amazon, it was claimed that the cost of land use assessment involving the acquisition and analysis of satellite images and ground-truthing (i.e., verifying what the images appear to show are true) came to less than \$0.20 per hectare (Southgate, 1998). Another serious monitoring and enforcement problem is who should do it; this raises national sovereignty concerns and the likelihood of disputes over the methods and results of monitoring. What is clear from all this is that inclusion of forestry in the CDM would give rise to a major new service industry in the measurement and certification of carbon offsets. Also, the measurement and definitional problems mean that countries unable to provide baseline data (carbon emission statistics, targets, plans, etc.) and lacking the capacity to measure the impacts could be left out of the process.

How big is the market for tropical forestry offsets?

Estimations by Pearce et al. (1998) indicate that the size of the market, at least for carbon trading through the CDM, may be considerably smaller than previously thought. Depending on the percentage of baseline emissions that can be met by carbon trading, the potential demand is estimated at 73-140 million tonnes of carbon (mtC). This implies that the potential demand for carbon credits could theoretically be met by Russia alone, in the unlikely event that Russia were allowed to trade all of its surplus credits and developing country suppliers are less competitive.

The Pearce study also points out that developing country CDM projects will be competing with East-West Joint Implementation carbon trades as well as 'emissions-allowance trading', and conclude that the market for developing country offsets is most likely to be in the range 60-120 mtC. Based on US Administration estimates of the price of traded carbon (\$14-23 per tC), this suggests an annual value of CDM tropical forestry carbon offsets of between \$840-2760 million, only 3% of Official Development Assistance. Other estimates, as that carried out for the World Bank (Ellerman et al., 1998) are more optimistic, and indicate that within 10 years a global market in emissions trading could be worth tens of billions of dollars annually, a 'substantial percentage' of which should flow to developing countries (Moura Costa et al., 1999).

Perverse incentives and the risk of 'marginal practices'

Since net emission reduction projects involve a comparison with 'baseline' carbon release in contiguous areas, there is a perverse incentive for governments to

increase deforestation outside the project area - since this will make it appear that more carbon is being saved. Countries making significant efforts to discourage deforestation would be penalised due to the improvement in their baselines. There is also a widespread fear that carbon offset trading will act as a powerful incentive to clear-cut old growth natural forests for plantations in order to generate offsets in the first Kyoto commitment period (McKenzie Hedger, 1998). This would clearly do more harm than good. In the absence of a strong regulatory framework, and as carbon offsets move from being a series of 'good deeds', there may be a temptation to indulge in 'marginal practices' (Stuart and Moura Costa, 1998) or 'creative carbon accounting' (McKenzie Hedger, 1998). The CDM makes a first attempt to tackle some of these problems, but is short on detail. It increases the urgency for independent verification¹⁴, and NGOs are also likely to play an essential role as system watchdogs during the early years of carbon trading.

Transaction costs

The economic case for carbon trading through tropical forestry becomes weaker when transaction costs are taken into account. At this stage in the development of carbon trading, these are high, due to such difficulties as defining baselines (involving extensive information collection exercises), payment protocols, monitoring arrangements, ensuring information transparency, contract enforcement, etc. These transaction costs are higher for tropical, as opposed to temperate forestry, but would fall if and when carbon trading 'takes off'.

Risks and opportunity costs

For supplying countries, carbon offset projects involve a set of risks and, if it displaces another productive land use, opportunity costs; carbon offset deals will only be made if the project benefits (to either the government or private landowners) are greater than those from alternative land uses like logging and ranching. There are substantial risks for both investors and suppliers, and the extent to which these can be mitigated will help determine how strong the supply and demand is (Pearce et al., 1998). Avoiding deforestation and afforestation can also carry high opportunity costs, including a negative impact on livelihood options, and these have to be weighed up against the likely benefits. Projects undertaken on marginal or degraded land are therefore likely to result in the highest net development benefits (Pearce et al., 1998).

What will happen to forest product prices?

It is reported that carbon trading could have a major impact on the prices of land and forest products (McKenzie Hedger, 1998), but whether prices will increase or fall is unclear. An increased demand for timber, for example in the construction industry as wood is preferred to high energy (and thus high tax) materials like steel, concrete, aluminium, etc., could greatly

stimulate demand and prices (Brand, 1998). However if carbon trading stimulates a large increase in plantations, there would be a downward pressure on prices. An internal evaluation by the US Forest Service of a proposal by President Bush for a massive increase in US afforestation to sequester carbon found that it could reduce pulpwood prices by 15% in real terms, rendering afforestation unprofitable (M. Arnold, pers. comm.).

5.2 Timber certification

Certification of timber (or NTFPs) from 'sustainably' or well-managed forests represents an attempt to increase demand for sustainable NFM. The main rationale for it is that an environmentally discriminating market will in time force those involved in unsustainable practices to improve their forest management in order to sell their produce on the world market; like carbon trading, it foresees the advent of more stringent environmental regulations. A second assumption is that consumers are prepared to pay a premium for timber products sourced from 'sustainably' or well-managed forests, this premium representing their willingness to pay for the ecological services and existence values of forests, and providing a major boost to the 'green market' effect. It should also provide a boost to secondary timber species.¹⁵ Certification also has wider benefits - it can contribute to increased transparency and accountability in the forest industry (Bass and Hearne, 1997). These attractions have ensured strong donor support.

Several types of certification are possible. Concession or company certification is the main current system and carries with it the marketing strategy incentive, but has not proved popular due to the costs involved and a dislike of having to conform to externally imposed standards. Product labelling may be the most difficult to implement due to the vast array of products and processes, and is more liable to be regarded as an illegal discriminatory trade measure by the World Trade Organisation (WTO). Country certification has the advantages that it requires policies to be adjusted so that positive incentives are sent out for NFM, is less vulnerable to being classified as a trade barrier, and could be easier to monitor through periodic inspection tours by internationally certified teams monitoring port traffic, reviewing forest policy and management plans, etc. (Barbier et al., 1994b). Ghana and Costa Rica are developing national certification programmes; Costa Rica's National Certification Commission has been set up to develop national standards for NFM and to monitor and supervise certification bodies.

There are two main routes to certification - through the Forest Stewardship Council (FSC) and its accredited certifiers, or through the International Standardization Organization (ISO):

¹⁴The ongoing experience of SGS Silviconsult in the verification of net carbon mitigation in Costa Rica's Protected Area's Project is reported by Trines (1998).

¹⁵There is evidence of this impact in the Quintana Roo natural forest management programme in southern Mexico, formerly known as the Pilot Forestry Plan (J. Davies, pers. comm.).

- FSC operates a complete package of a forest management standard, an international accreditation programme for certifiers, a trademark which can be used in labelling products from certified forests, and a communications/advocacy programme (Bass and Hearne, 1997). At least eight buyers' groups have been set up with commitments to buy only FSC-certified timber and timber products, e.g. the WWF 2000 group in the UK;
- The ISO 14001 forestry initiative offers a framework for the certification of environmental management systems (EMSs). The main differences with the FSC approach are that it does not specify management performance standards, and there is no labelling. The EMS is certified rather than the forest. Although not strictly a forest certification programme, Bass and Hearne (1997) believe the ISO approach allows more potential to assess the environmental quality of forest management.

A recent survey by the European Forestry Institute revealed a strong industry preference for the ISO certification process. This is because the ISO process encourages the development of internal management capacity, the standards are set by the company and not by outsiders (so is more in tune with private sector philosophy), companies are used to ISO standards in other operations like processing, and it is cheaper than FSC certification (Bass and Hearne, 1997). Among the various other stakeholders in certification, the environmental NGO lobby favours the FSC system because it ensures there is an impact on the forest. However the two approaches may be compatible: the adoption of FSC standards and an ISO system to achieve them could be a way forward for national certification systems (Bass, 1998).

Limits to certification

Most certification has been in the north, but, a number of community-based NFM projects in Mexico, Bolivia, Honduras and Papua New Guinea have received FSC certification. However there is little evidence that, as yet, certification has caused a shift towards sustainable management. Studies of the impacts of certification on the Bolivian and Honduran projects (Markopoulos, 1998a and 1998b) indicate the difficulties of supplying the niche export market for certified timber, but it should be pointed out that certification is a very recent development, and it is therefore rather early to assess its impact. Among the main problems and objections to certification, which have limited it as an effective incentive for NFM so far, are (Ghazeli and Simula, 1998; Barbier et al., 1994b; Bass and Hearne, 1997):

- the thin demand for certified timber: there is little willingness to pay by consumers for certified timber and at present, demand for it comes mainly from retailers who value it as a marketing strategy. The upper limit for a premium is 10% according to most studies; secondly, only about 6% of tropical timber comes onto the world market, and at present the demand for certified timber is mainly limited to north-west Europe. The 1998 EFI survey found that timber quality, durability, form, material and price were more important than

environmental considerations, although certification was seen as a source of competitive advantage in the market place; and there is a fear is that if the higher costs of tropical NFM certification are passed on to the consumer, this will encourage further substitution by temperate timber and non-timber substitutes;¹⁶

- the threat to certification posed by WTO rules: discrimination between sustainably and unsustainably harvested timber is regarded as a trade restriction, although WTO agrees that Technical Barriers to Trade (TBTs) are acceptable if they protect consumers, the environment or plant health. WTO rules, as they stand, represent a serious constraint to certification, and implies that it can only be introduced on a private, voluntary basis, as opposed to the obligatory basis that is ultimately needed, and that it should not look beyond purely environmental objectives (e.g. WTO views social standards as preventing countries benefiting from their low labour costs);
- the technical problems of certification: nearly all the forest industry respondents in the EFI survey regarded 'chain-of-custody' verification as highly problematic, given that timber products are composed of wood from various sources and the difficulty of tracking end uses of timber. Another problem is how to stop 'cheating', e.g. certified concessionaires buying in timber from non-certified sources and selling it on as certified timber. Linked to all this is a credibility problem for certification: will discerning consumers believe the labels?;
- it is too easy for exporters to supply indiscriminating markets;
- it favours plantations and temperate forestry in general since the costs of certification and monitoring it are less due to lower technical, biological (e.g. the relative ease of maintaining existing biodiversity), policy and social complexities (absence of indigenous peoples, colonists, etc.);
- the difficulties of monitoring certified forests, including the potential for international disputes and the heavier burden placed on over-stretched FDs;
- the difficulty of reconciling national participatory processes and achieving some minimum level of international harmonisation of certification standards and procedures;
- it favours large export-orientated forest managers or owners, since the unit cost of certification falls with scale;
- the objection that timber certification represents historical discrimination against tropical forestry.

Bass and Hearne (1997) have suggested how to increase the positive effects of certification, especially how to get it to apply to poorly managed forests and to minimise costs by:

- ensuring that large scale operators are made more accountable for their actions than small local groups

¹⁶There is also a concern that substitutes for tropical timber are not subject to similar standards, whether referring to temperate timber or substitutes like plastic, aluminium and steel, and so it is not a level playing field.

motivated by welfare considerations, most obviously through stronger regulatory and forest management control systems;

- emphasising performance monitoring and verification;
- developing buyers' groups in markets for which most supply is from unsustainable sources, as in Southern Europe and East Asia (although this could be difficult given the economic downturn);
- amalgamating process and performance standards, as in the national certification programme of Ghana; and
- setting up national working groups on certification with broad stakeholder representation to develop national forest standards.

5.3 Fair trade

The fair trade movement involves the development or expansion of markets in which consumers recognise the importance of equity issues in the market place for tropical produce. While environmental issues have not been emphasised much as yet, fair trade seems an obvious vehicle for encouraging forestry among forest-dependent peoples. However this could fall foul of WTO regulations, because the social standards in fair trade agreements are seen as limiting economic decisions (in the same way as social standards in timber certification), and because environmental discrimination can be interpreted as 'unwarranted protectionism' (Bass and Hearne, 1997).

5.4 Bioprospecting deals

Biodiversity prospecting and other deals between northern commercial interests and grass-roots or national conservation agencies are classified by OECD (1995) as 'exotic capital'. This source listed about 20 companies engaged in 'formalised' genetic material prospecting activities, with 'hundreds' of informal deals, but there is minimal public information on the contracts. The deals have a mix of profit and conservation motives, although the cynics would argue that the latter is mainly PR.

Once again there has been considerable hope (and hype) expressed about the potential value of pharmaceutical discoveries to give value to the forest, largely it seems based on the discovery of leukemia treatment drugs derived from the rosy periwinkle (*Catharanthus roseus*) in Madagascar, and the Merck deal in Costa Rica, presented in Box 8. Incentives are

best provided by a system of royalty payments dependent on discoveries rather than one-off payments for access (OECD, 1995). In the latter case, the sellers have little incentive to maintain biodiversity, while on the other hand the 'share of royalties' approach involves a higher risk, and sellers might get disheartened. There is also a strong case for deals to include the transfer of research capability.

In order to promote bioprospecting deals, the International Co-operative Biodiversity Group (ICBG) Programme has been established by three US agencies (National Institute of Health, National Science Foundation and the US Agency for International Development) in order to promote an alternative model of biodiversity prospecting in which more would be returned to the local users (OECD, 1995). \$12 million were pledged for the first five years of its development.

Limitations of bioprospecting deals

The first issue is the probability of success in commercial drug development: OECD (1995) rate this as a 1 in 10,000 chance. Even if an interesting drug is developed, it is unlikely to be sufficient to ensure conservation by local people. Southgate (1998) considers the economics of sap from the *sangre de drago* tree (*Croton* spp.) which grows in Latin American rainforests. The sap has medicinal properties and is now sold in health food shops in Europe; Shaman Pharmaceuticals of San Francisco has been conducting clinical trials to test its safety and effectiveness in the treatment of drug-resistant herpes and respiratory problems in children. As a result of increased demand, producer prices rose to \$4.25 per litre in 1994, but the resulting NPV was only about the same as the opportunity cost value of the forest.

Another economic study estimated that Costa Rica's 600,000 ha of parks and reserves might be expected to yield about 1,000 samples a year for testing, and that the present value of royalty payments from a 1 in 10,000 discovery rate would amount to \$4 million per year (Aylward, 1993). This compares to an estimated opportunity cost value of \$200 million!

Biodiversity deals, as presently drawn up, tend to bring minimal local benefits (OECD, 1995). One difficulty for drawing up equitable contracts is the lack, and inequitable distribution, of information. Another problem is that genetic engineering developments have reduced the need to resupply from source; for example, recombinant DNA methods only

Box 8. Bioprospecting deals in Costa Rica

In the 1982 bioprospecting deal between Merck & Co., the World's largest pharmaceutical company, and the National Biodiversity Institute of Costa Rica (INBio), INBio collects and processes plant, insect and soil samples and sends them to Merck for screening. Merck made a one-off payment of \$1 million, and an undisclosed share (probably 1-3%) of the profits from any drug developed from Costa Rica's forests, with the patent rights remaining with Merck. INBio has a number of other deals, including one with the British Technology Group for natural nematicides which includes production and distribution of any commercial production in Costa Rica. INBio will channel proceeds from these activities to the Ministry of the Environment and Energy, and into the fund for environmental service payments to forest owners discussed in Box 3.

Source: Barbier et al., 1994a; Stuart and Moura Costa, 1998

require minute samples. As with intellectual property rights, the future for bioprospecting deals depends on the development of appropriate international regulations, mechanisms and institutions, including a system for settling disputes over patent rights and exclusive licensing agreements (Barbier et al., 1994a).

5.5 Marketable Forest Protection and Management Obligations

A global system of marketable forest protection and management obligations (FPMOs) has been suggested by Sedjo et al. (1991). Under a voluntary global forestry agreement, the aggregate or global requirement for protecting or managing forests could be distributed to the signatories according to a formula based on the mix of their forest areas and national incomes. Holders of FPMOs must either fulfill their obligations on the ground or induce another agent to assume them by means of a payment. Thus countries with large obligations (based on income levels) and small forest areas would have an excess of obligations, while countries with small obligations and large forest areas would have excess forest, providing a basis for negotiation and trade.

Such a system would have the advantage that countries would comply with conservation and NFM obligations from self-interest, and non-forested countries would have relatively higher costs. The difficulties lie in negotiating a comprehensive international agreement to establish the system, the need for an international institution or 'clearing house' to allocate the certificates and regulate international trade in them, and the normal monitoring and enforcement problems (Barbier et al., 1994b).

6. CHANNELLING PRIVATE AND PUBLIC INVESTMENT FLOWS

6.1 Micro-finance and rural savings

Some analysts argue that conventional state or private-sector banking institutions are inappropriate for channelling credit to local forest users and communities, who therefore lack access to institutional credit (Fedora, 1996). Also, mobilising domestic rural savings through micro-finance programmes may be more effective than 'high-tech' financial solutions (Pearce et al., 1997). Experiences in micro-finance like the Grameen Bank in Bangladesh, the Aga Khan Programme in Pakistan, and FINCA in Costa Rica, have been hailed as rural development success stories and have encouraged the approach to be extended to the forestry sector.

The approach involves combining credit (whether subsidised or not)¹⁷, especially in the form of revolving loans; appropriate institutional mechanisms both in terms of the credit or service institution and grass-roots

management of the credit; participatory management methodologies; and appropriate administrative and organisational training. The Grameen Bank, with the help of local NGOs, has stimulated at least 2,500 groups to practise social forestry (Joshi, 1998). The Regional Forestry Programme for Central America (PROCAFOR) supported by FINNIDA has focussed mainly on poor all-women groups, providing revolving credit initially for small-scale family economy activities as a precursor to more complex forestry activities (Mejia and Benitez, 1998). The village banking groups also provide the basis for other activities like literacy development.

An apparently successful and innovative experience is the '*Los Arboles Valen*' (trees have value) programme in Nicaragua (Instituto Nitlapan, 1998) in which farmers can access low interest and long-term credit in proportion to the number of trees they plant. Farmers have a free choice of tree species, including fruit trees, and can plant them as they like, although the programme provides technical information and advises farmers on what management system (small plantations, live fences, windbreaks, etc.) might best suit their objectives.

However, some recent case studies show that improved access to finance for poor farmers can encourage a movement away from tree growing (M. Arnold, pers. comm.). This is because the credit enables farmers to hire more labour, allowing them to move out of low labour input tree growing and into more labour-intensive and productive land uses.

6.2 International private capital flows

Potential and Constraints

While public finance and international aid for forestry are unlikely to increase, private capital flows to forestry have increased every year since 1991 (Crossley et al., 1996), and many analysts argue that the main hope of 'innovative financing' is to redirect some of the enormous international flows of private capital towards forestry. For example, Moura Costa et al. (1999) believe that only the private sector can provide the volume of capital necessary to make the transition to a sustainable forestry paradigm. There are three main types of private capital flows:

- investment by foreign companies in tropical forestry, often in the form of joint ventures with local firms, and sometimes supported by public funding;
- portfolio investment or equity capital in which stocks and bonds are purchased by individuals and institutional investors;
- commercial bank loans.

However, these and other observers point out that in order to attract international investors, various constraints need to be overcome:

- low profitability and an unsupportive policy environment for forestry;

¹⁷ Fedora (1996) stresses the need for non-financial costs (training, institutional development, etc.), to be covered by grant aid in order to avoid high interest rates being charged to the beneficiaries.

Table 2. Characteristics of normal stock market and 'timber' investments

Stock Market	Timber Investments
organised many buyers and sellers simple sales mechanism broad array of transaction evidence broad availability of informed advisers highly liquid rapid realisation of proceeds few closing problems	unorganised few buyers and sellers complex sales mechanism scarcity of transactions evidence few informed advisers tends to have low liquidity proceeds typically delayed frequent closing problems

Source: Zinkhan et al., 1992 (reproduced in Joshi, 1998)

- the perceived high risk of investing in a new sector and market;
- the lack of information on investment opportunities;
- high entry barriers to new investors;
- the lack of tailored forestry financing vehicles;
- underpricing of timber, weak state control and inadequate information to shareholders resulting in overvalued timber companies;
- auditing problems.

To counteract these problems, Crossley et al. (1996) identify four main areas of action:

- education of potential investors in the range of investment opportunities;
- packaging these opportunities in ways acceptable to the private sector;
- reducing the risks and incremental costs of an emerging industry;
- covering the additional private cost of internalising environmental externalities.

Joint private sector and public-private partnerships

A number of promising joint partnerships are reported by Crossley et al. (1996). A successful private joint venture has been the association between Piqro, a Mexican hardwood flooring company and a New Jersey flooring distribution company. Capital advanced by the latter enabled Piqro, which sources much of its timber from nearby *ejido* groups practising community-based forest management, to modernise its plant and effectively access the export market. Another promising joint venture, this time with donor support, involves a Danish timber trading company and a Ghanaian timber company, Ghana Primewood Products Ltd. The latter has been granted a 16,000 ha concession and, supported by Danish aid, is trying to promote good forest management practices in the concession and involve local communities, mainly through a type of outgrowing scheme.

Recognising that public sector finance is crucial in the start up phase of forestry enterprises attempting to move towards sustainable management, the multilateral

development banks, and some bilaterals, have a number of funds aimed at promoting private interest in forestry via public-private sector financing partnerships. Much of the effort involves helping the private sector identify investment opportunities linking financial and environmental performance. These initiatives, including the World Bank Market Transformation Initiative, are discussed in Appendix 1. Various other experiences like the development of a system for promoting carbon offset trading in Costa Rica (Box 7) involve joint public-private sector funding. The potential of public sector finance to exert leverage on the private sector is emphasised by Moura Costa et al. (1999).

The potential of equity capital and associated investment instruments

Equity capital is already an important source of finance for the timber industry, and there is an increasing trend for large forestry companies to become listed on the stock exchange (Grieg-Gran et al., 1998). The growing interest in the potential of motivating institutional shareholders to influence portfolio priorities is linked to the recent growth of ethical and green funds. Increased information to shareholders has resulted, for example, in the sale of holdings in some Malaysian timber companies. However a survey revealed that fund managers felt that increased information on social and economic performance of timber companies was not a priority (Grieg-Gran et al., 1998). Ethical funds have apparently avoided NFM in the past due to the unreliability of performance assessment, implying that certification could play an important role in encouraging investment.

Primarily private sector attempts to channel Northern equity capital into sustainable forestry, include those of two US-based companies, Xylem Investment Inc., which focuses on plantation investments in developing countries, and the Forestland Company, which invests in NFM (Crossley et al., 1996). Precious Woods Ltd., part-financed by Swiss pension funds, and with some official aid, is trying to promote NFM in Brazil and Costa Rica. The idea of an international forestry investment fund is being promoted by Coopers and Lybrand, the World Bank

and the MacArthur Foundation amongst others. This would be a publicly listed investment fund based on a mixed portfolio of different types of forestry in both tropical and temperate countries (spreading risk), with the investments rated for their environmental practices and set against NFM guidelines prior to investment (Moura Costa et al., 1999). Investment targets would include under-capitalised companies needing an injection of capital to shift towards more efficient and sustainable forestry practices. The fund would be sponsored by high profile institutions with financial, forestry and environmental credentials in order to give confidence to investors.

Fixed-rate sustainable forestry bonds being promoted by Delphi International, London, could prove an appropriate investment instrument for forestry according to its proponents. It is claimed that forestry's time problem can be tackled by capitalising the long-term income stream from forestry, making it more attractive in terms of the potential for up-front receipts from standing forests (Mansley, 1996). The New York-based NGO, Environmental Advantage, is also promoting the idea of a tax exempt-bond for public purpose forestry which would allow non-profit NGOs to access institutional capital for NFM or conservation (Crossley et al., 1996). The tax exemption derives from recognition of the public good values. Another idea is to develop a futures market in 'sustainable' forest products. A 'future' is a standardised openly-traded contract to deliver a fixed quantity of a particular product - in this case timber from well-managed sources. A futures market in 'sustainable timber' could also increase transparency and stabilise prices, but does not provide the initial investment (Mansley, 1996).

Given the accelerating progress of establishing carbon emission quotas and carbon trading, the highest potential could be in developing new financial instruments for greenhouse gas mitigation services (Stuart, 1997). It is suggested that alternative energy, energy efficiency and forestry-based investments could be structured in such a way that positive environmental performance, which would have a future monetary value dependent on policy trends, could be separated from conventional financial returns.

The potential of a multilateral environmental agreement on portfolio investment (c.f. the Multilateral Agreement on Investment) is raised by Grieg-Gran et al. (1998). This could link financial flows to international environmental agreements; for example, if a government was committed to carbon mitigation, private investment from that country should not fund carbon-intensive development.

Provision of risk mitigation services

Emerging markets are characterised by high risk. Investment in tropical forestry is constrained by exchange rate risks, repayment risks, political risks, ill-defined property rights, etc (Crossley et al., 1996). According to WFSCD (1997) this gives rise to a potentially large private

'trade' with global environmental benefits. This 'trade' could be based on an international agency like the GEF providing services or funds to share or help 'buy down' risk. Risk reducing services include political risk insurance, 'currency hedging' and negotiated tax breaks (Crossley et al., 1996). Risk mitigation is also a major rationale of the suggestion by Moura Costa et al. (1999) for an Investment Promotion Agency for sustainable forestry.

Limitations of private capital flows

The problem for most of the above approaches is that, at least for sustainable NFM and conservation, attractive investment opportunities will remain scarce while policy and market failures persist. Thus Grieg-Gran et al. (1998) point out that in the absence of international regulation, market incentives will continue to de-link environmental and financial performance. Also the idea of competing in more discriminating financial markets to cover the investment costs of NFM may not be attractive to industrial investors. The difficulties for attempts to promote a stock market approach to forestry investment are highlighted in Table 2, which compares some of the characteristics of normal stock market and forestry or 'timber' investments.

The concern that increasing private international capital flows to tropical forestry could make things worse if the underlying incentives remain unchanged is summed up by Mansley (1996:129): 'if natural assets are incorrectly priced, then the operation of financial markets will encourage unsustainable behaviour. Indeed, the more efficient and liquid financial markets become in a system in which the pricing mechanisms do not reflect sustainable values, the greater the threat to sustainable development.'

7. PROPERTY RIGHTS APPROACHES

7.1 Secure property rights

Some analysts argue that granting exclusive or secure property rights confers trust and custodianship, and that insecure property rights represent the most serious kind of perverse incentive (Panayotou, 1997b): they result in under-investment in forestry or any form of land improvement, prevent access to capital, reduce tax revenues, and result in high negative externalities. By contrast, secure property rights reduce the risk of free riding, facilitate contractual arrangements with outsiders (for example, allowing payments for externality benefits) and lower the discount rates of owners so that long-term planning and investment is encouraged (Soberon et al., 1997).

While insecure property rights are likely to discourage sustainable forestry, it is by no means certain that the converse is true. Secure property rights are only likely to result in forest retention when forestry represents a more attractive long-term livelihood or investment option than alternative land uses, and land values are higher with forest

Box 9. Forest User Groups in Nepal

Since 1978 the state-owned Middle Hill woodlands of Nepal have gradually been transferred in usufruct to organised Forest User Groups (FUGs). The creation of community forests became a lynchpin of national policy. Through innovative legislation and regulations, 150,000 ha of state forest had been transferred to 3,500 FUGs by 1997. The FUGs are expected to manage the forests with a management plan and a strongly participatory approach is encouraged, e.g. each FUG makes up the rules and sets the fees for extraction of forest products, forestry maintenance, fire control, etc. Most FUGs have generated funds for community development projects, and FUG forests tend to be much better managed and protected than the state forests were.

However the FUG experience is also raising some equity concerns: more powerful members of the community, formerly non-users of the state forest since they had enough on-farm tree resources to satisfy their needs, are encouraging the long-term objectives of forest management by reducing forest product extraction in the shorter term. This has resulted in reduced access, in comparison with state forests, for the poorer villagers less able to afford the longer term management objectives due to their lack of on-farm tree resources. Poorer villages sometimes travel long distances to open-access woodland to obtain essential tree products for the household economy. Donor-supported community forestry projects are struggling to redress this imbalance, but are up against local political economy realities.

Sources: reports of the Nepal UK Community Forestry Project; Preston (1997)

cover than without it. In Costa Rica, it is recognised that forest owners also need environmental service payments to convince them of the economic case for retention. Due to policy failure problems like land tenure legislation which rewards deforestation, forest land is often worth more when cleared of trees, as for example in Amazonia (Richards, 1997b). It should also be pointed out that secure property rights do not necessarily mean land ownership; in many customary systems in Africa, people who plant trees are assured of continued rights to the produce even after they have relinquished control of the land (Arnold and Dewees, 1997).

7.2 Creating community usufruct rights

The most common situation in which weak or ill-defined property rights lead to deforestation is in open-access forest where the state is the owner-manager but lacks capacity, and where common pool regimes are absent or in decline. There are a growing number of cases in which the state has granted long-term usufruct rights to encourage community-based NFM on state forest land. Box 9 reports on the creation of community usufruct rights in Nepal, and indicates some of the difficulties involved in a property rights approach to NFM.

A well-documented example of a property rights approach linked to financial incentives is the CAMPFIRE programme in Zimbabwe, in which local communities have been granted property rights over high-value wildlife tourism, including trophy hunting (OECD, 1995). A key aspect of these experiences has been the partnership between Rural District Councils and local communities. Among the lessons of CAMPFIRE are that the scale needs to be small enough to allow local institutional controls to operate; care is needed to ensure the equitable distribution of costs and benefits; and the importance of linking control

and responsibility. Unfortunately for forestry, due to the difference in values there is little potential for applying the CAMPFIRE model to forestry.

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Sources: reports of the Nepal UK Community Forestry Project; Preston (1997)

7.3 Overlapping property rights

An innovative property rights approach is overlapping property rights or partial privatisation. Property rights can be designed to allow private exploitation of forest products (and possibly some services), while the state retains control and protection of public good services (Bass and Hearne, 1997). Overlapping property rights or user permits could be used for different goods and services from the same area of forest, and these could be traded to ensure efficient allocation. It is also argued that as long as they are specific and well-defined, overlapping property rights could be useful for conflict resolution. The

drawbacks are the difficulties in allocating rights (the only obvious basis being traditional use); the investment needed for zoning; and the strong state regulation capacity required.

7.4 Concessions

Industrial forestry concessions

The issues surrounding bidding for timber concessions were briefly covered in 3.3. Some argue that long concessions would ensure a long-term interest in the resource, and it has even been suggested that concessions could be sold to private owners as a reward for responsible management (ITTO Newsletter Vol 5(4):19). However, others point out that while the underlying incentives encourage forest mining, and control is weak, longer tenure will not help. Gray (1997) argues that it would be better to have short concessions of 10-12 years with regular audits, bidding and strict regulation, as well as a financial incentive in which the payment of forest fees is linked to performance (possibly through performance bonds). Gray (1997) proposes forest management concessions in which concessionaires agree to manage the forest for timber and public good values in exchange for security of timber supply.

Service concessions

An innovative approach in Costa Rica, although on a rather modest scale, has been to grant service concessions in protected areas. In the Volcán Poás National Park, a Concession Fund was set up on the basis of auctioning service concession contracts (Heindrichs, 1997). Three private sector operators have been awarded contracts, following auctions, to operate a cafeteria, a souvenir shop, and an insect exhibition on the payment of a small concession fee. These concessions raised \$41,200 in 1996, and were reported to be working smoothly.

7.5 Tradeable development rights, franchise agreements and conservation easements

Domestic tradeable development rights

Tradeable development rights (TDRs) are one of the most innovative, but least implemented IFIMs. TDRs are rights to development in areas designated for conservation that can be sold to public or private sector conservation interests, or exchanged for development rights on land outside the 'restricted use' areas. The sale of TDRs provides the financial means of compensating restricted or 'attenuated' property rights. It is only the development rights that are sold or exchanged, not the land itself - so communities or owners can continue non-degrading activities like eco-tourism. The exchange value of TDRs should reflect a balance of the buyer's willingness to pay for the public good values, and the seller's estimation of their foregone development benefits.

Thus it only works if there is sufficient willingness to pay for public good values. The only examples of TDRs in a forestry context are from North America, although in Chile a system of tradeable water rights has resulted in an active market for water rights involving a trade between upstream and downstream users (Panayotou, 1994). In the US, the impetus has come from land use zoning regulations in which land has been divided between conservation and development areas: in Virginia, development rights in a mountain conservation area were to be purchased by local government using a range of finance options including a property transfer tax, a cellular phone tax, meals and lodging taxes, grants and private contributions (Preston, 1997).

TDRs can also be thought of as a market-based instrument: as in the Chilean case, the rights should become regulated by the market with minimal state intervention. Panayotou (1997a) believes domestic TDRs would only take off if purchasers could set them off against a general conservation tax; this implies an unlikely level of political and financial commitment.

Box 10. International Franchise Agreements

An International Franchise Agreement is a concession by the state-owner to a franchisee land user with limitations on land uses in the interests of a third party (the global community). The latter is represented by a bilateral agreement between a donor or international organisation and the state. The land's development rights are divided between the global community and franchisee in a way that maximises the state-owner's return to land: the state-owner collects rent from the franchisee for allowable uses like eco-tourism and receives compensation payments from the global community for the land use restrictions placed on the franchisee. Both the franchisee holders and global community hold development rights and have an incentive to police their allocations, while the state-owner's incentive is to maintain the rental flows.

Source: Cervigni, 1993

International TDRs and Franchise Agreements

International TDRs represent a potential means of capturing and internalising global externalities. The only difference with domestic TDRs is that the buyer would be an international entity. The equilibrium price should lie between the willingness to pay of the international community for a nation's conservation benefits, and a supply price based on the opportunity cost of conservation or foregone development benefits. International Franchise Agreements (IFAs) represent a contractual structure for TDRs on state-owned land in which national sovereignty is respected, conflicts are minimised, and appropriate land use incentives are promoted (Cervigni, 1993). Box 10 explains how they work.

Who would buy TDRs? Panayotou (1997a) suggests the following potential buyers:

- local and international environmental NGOs expressing existence values;
- governments expressing global public good values on behalf of the voting public;
- corporations interested in carbon offsets; 'exotic capital' to improve their image; genetic material for pharmaceutical development; and eventually in speculating that TDRs will increase in value as demand for conservation grows with international regulations;
- scientific institutions buying the 'information value' of a site.

Among the advantages claimed for TDRs (Barbier et al., 1994a; Cervigni, 1993) are that:

- they can be established on a bilateral rather than unilateral level, and therefore do not need an international convention;
- the system relies on the market place to determine the value;
- national sovereignty is respected, and countries can retain control over the process.

However the same sources point to some major problems:

- payment is conditional on performance, and this requires monitoring: how it is done and by who is a politically sensitive issue;
- the initial division of land between development and conservation areas, the establishment of a market for TDRs, and the distribution of benefits requires careful research, planning and management: this capacity does not usually exist at the local level and would need outside funding and support.

Conservation easements

A conservation easement is a special type of TDR in which a landowner and conservation organisation enter into a voluntary legal agreement in which the former is compensated for restricted use of the land in order to protect a specific habitat. While a system of conservation easements has been suggested for the Amazon (Box 11), the only documented examples are from North America (Preston, 1997).

7.6 The global commons and intellectual property rights

Through the Conventions on Climate Change and Biodiversity Conservation, there have been agreements to attenuate the rights of some nation states, for example in the agreements to restrict ozone and carbon emission levels. But the absence of a system of global governance results in a type of 'global policy failure' (Cervigni, 1993) in which the power to limit and confer rights over the global commons is limited, 'free-riding' is encouraged and a range of regulatory and property rights-based instruments for NFM and conservation are ruled out.

The Biodiversity Convention recognises that nation states have sovereign rights over their own resources but a 'moral duty' to protect them, while other nations have an 'obligation' to pay for any benefits they receive from

Box 11. Conservation easements for the Amazon?

It is suggested, firstly, that supplier countries establish an offer price for conservation easements on the basis of the opportunity costs of conserving different habitats. These could be ranked by leading ecologists for their conservation importance, as a basis for assessing buyers' (international NGOs, consortiums of companies aiming to improve their public image, etc.) willingness to pay. Brazilian ecologists have already developed a scheme for prioritising habitats based on biodiversity variation.

For each habitat type the 'ecological profit' should be established: this is the difference between the supply (opportunity cost) price and the demand (willingness to pay) price. From the overall purchaser's budget, the easements can then be bought up in a descending order of profitability, and transferred to the suppliers in the form of an annuity. It was crudely estimated that with a supply price of \$100/ha, preserving 10% of the Brazilian Amazon (37 million hectares) would cost \$3.7 billion, or an annuity of \$203 million over 50 years. However such a scheme would have a high enforcement cost.

Source: Kazman & Cale (1990)

Box 12. Forest Partnership Agreements (FPA)

FPA between countries and donors were introduced by UNDP in 1995, with the Ecuadorean FPA as a pioneer. They are legally binding codes of conduct and protocols for action within a framework of international cooperation, but are country-led and implemented. An FPA starts with cabinet level commitment, policy reform, action on property rights, forest pricing, etc. It should be based on a broad consultative process involving local stakeholders, and have as an explicit objective the transfer of capacity and control to the local level. As with the World Bank's Sector Investment Programme, it emphasises the broad context of forestry; includes all sectoral expenditures; tries to develop a clear sector strategy and policies; and places local stakeholders (including local government) in charge as far as possible.

Source: Simula, 1996

exploitation of the resources, especially in the case of biotechnology development. The most pressing need is to recognise and support intellectual property rights over genetic resources, especially where forest-dependent peoples are concerned. An international system of biodiversity patents and intellectual property rights would, by making them stakeholders in protected areas, provide local communities with a powerful conservation incentive (Panayotou, 1997b).

8. INSTITUTIONAL ASPECTS OF INNOVATIVE FINANCE

'Incentives for biodiversity conservation can only become effective within a supportive institutional framework. Even carefully designed policies are unlikely to achieve their objective unless they are linked to institutions capable of implementing, monitoring, enforcing and assessing these policies at local, national and international levels' (Wells, 1997:167)

8.1 Institutional failure

Institutional arrangements are critical to the success of any IFIM: organisational forms, legal rules, and enforcement mechanisms, as well informal institutions like norms of behaviour, must be right for an incentive to work. Also it is the relative power and influence of institutional actors at the local, national and international levels which determines the mix of incentives and policies: therefore there is a need for strong forest sector institutions. Institutional failure occurs where institutions are poorly designed, do not coordinate well or do not exist (Wells, 1997). The greatest institutional failure is at the global level: global institutions are needed to enforce property rights over the global commons, and to provide the regulatory basis for markets in global externalities.

Because the situations are complex, a diverse set of institutional arrangements is necessary. Several sources point to the problem of purely top-down administrative arrangements, which are prone to failure (OECD, 1995). Pointing out that the success of any programme depends on people's attitudes, the capacity to harness local knowledge and local ownership of solutions, Young and Gunningham (1997) argue for the subsidiarity principle:

that the authority and responsibility for implementing incentive-based mechanisms should be transferred to the lowest level at which they can be exercised effectively. Effective decentralisation requires the empowerment of local institutions. For example, in Thailand it is local government which levies taxes on forestry-related activities and channels the money back to forest-dependent communities (Wells, 1997).

8.2 National Forestry Programmes (NFPs)

Coordination between institutions is essential for improving the effectiveness of forest financing. While greater coordination is needed between donors and between sectoral policies, the emphasis placed by Simula (1996) is on forest sector coordination. Without strong sectoral leadership, there is a risk of a return to earlier approaches emphasising independent project-based activities with limited impacts. The main problem for Simula is that financing mechanisms have been independent of sectoral planning and programming approaches, and National Forestry Programmes (NFPs) have been relatively ineffective since they have not been converted to sectoral investment programmes.

By 1997 there were 13 NFPs (Blanchet and Dube, 1997) although about 100 countries had agreed on the NFP process as a basis for developing a global framework for sustainable forestry. NFPs should be country-driven and involve a participatory, multidisciplinary and transparent process. NFP investment programmes, where they exist, try to facilitate action by the private sector and civil society. This means tackling policy failure and trying to provide appropriate incentives. The main instrument for sourcing external support to NFPs is the Forest Partnership Agreement (Box 12).

8.3 National Environment Funds

NEFs represent another important institutional mechanism for coordinating innovative forest finance (see 4.3). They have been particularly important in transitional economies. If designed correctly, NEFs can strengthen environmental enforcement, generate additional financing by showing the 'bankability' of environmental projects, enhance domestic skills and capacities in the preparation and appraisal of

Table 3. The potential of IFIMs for natural forest management and conservation

	Tackles market failure	Tackles policy failure	Impact on user incentives	Revenue raising	Market solution ('self-regulating')	Impact on timing problem of NFM	Experience in using mechanism	Technical problems	Political will needed	Donor/ internat. influence
'Polluter and beneficiary pays' MBIs	++	++	++	++			some	med.-high	med.-high	low
Differential land use taxes	++	++	++	++			very little	med.-high	high	low
Concession bidding	++	++	++	++			some	medium	med.-high	med.-low
Performance bonds	++	++	++			++	very little	high	med.-high	med.-low
Global Environment Fund	+						much	medium	low	very high
Debt-for-nature swaps	+						much	low	low	very high
NEFs/conservation trust funds	+			+			much	low	low	high
Tax on international timber trade				++			none	medium	very high	high
Other international taxes	+			++			none	medium	very high	high
Area-based payments to FMUs	++	+	++			+	none	very high	very high	high
Carbon trading	++	+	++	++	++	++	increasing	very high	med.-high	high
Timber certification	+	+			++		some	high	medium	med.-high
Bioprospecting deals	+				++		some	low-med.	low	med.-low
Marketable FPMS	++	+	++		+	+	none	very high	very high	high
Micro-finance		+		+		+	some	low	low	high
Mobilising portfolio capital				++	++		very little	low	medium	med.-high
Tradeable Development Rights	++	+	++	+	++		very little	very high	very high	high
Overlapping land rights	++	++	++		++		very little	medium	high	low
Intellectual property rights	++	++	++		+		none	medium	very high	high

projects, and encourage local participation in decision-making (Pearce et al., 1997). NEFs are usually legally constituted as a non-profit foundation (in civil law countries) or a trust fund (in common law countries) able to operate independently of the government, but governed by a Board of Directors from the public as well as private sector.

8.4 Costa Rica's National Forest Finance Fund (FONAFIFO)

Costa Rica is also leading the way in terms of developing appropriate institutional forms for managing the process of raising and distributing innovative finance for forestry. In 1995, FONAFIFO (*Fondo Nacional de Financiamiento Forestal*) was established under the aegis of the Ministry of the Environment, specifically to promote forestry activities in privately owned forests and to access non-governmental financing sources (Heindrichs, 1997). FONAFIFO is a parastatal able to handle monetary flows independent of the state budget, and has strong private sector involvement; two of five seats on the governing body are held by the private sector. FONAFIFO is also expected to finance itself so there is a big incentive to develop new sources of financing (see also Box 7).

9. DISCUSSION

9.1 The relative potential of innovative financial incentives

Table 3 attempts to compare a range of IFIMs against a set of criteria in order to generate some clarity for prioritisation, particularly from the donor viewpoint. Although it involves a number of subjective and marginal judgements, the table reveals some broad patterns about the potential of different approaches. Not all the mechanisms or instruments discussed above are included, but only those with the most likely impact on NFM and conservation.¹⁸

Domestic fiscal market-based instruments

These mechanisms score strongly in terms of tackling policy and market failures causing perverse incentives, and to bring private costs closer to social costs. They can also raise revenue which can be used to strengthen the regulatory basis of NFM, and so reap a 'double-dividend', but Karsenty (1998) warns that attempts to achieve dual incentive and revenue objectives usually end in failure. If the main aim is to influence user incentives, revenue benefits should be treated as a bonus and not influence design of the instrument. Where watershed protection

¹⁸ The viewpoint here is that tree planting should be largely self-financing; the main situation in which some mechanism of 'internalising the externalities' is called for is where significant national and/or local watershed protection values are at stake. This could be through a 'polluter or beneficiary pays' charge.

values are at stake, polluter and beneficiary pays taxes have particular potential. In the context of forest concessions, performance bonds have the potential to overcome the discounting problem of NFM by adjusting the income flow so that the opportunity cost (to the concessionaire) of staying on in the same piece of forest is greatly reduced.

This set of instruments relies on a strong market intervention logic, and thus requires considerable domestic political will over which donors have little influence. There are also major implementation problems. However donors might do more to encourage them, for example by helping build the administrative capacity to establish, implement (including effective revenue collection) and monitor MBIs, and funding research to establish optimum tax levels and assess the likely economic and environmental impacts.

International transfer payments

The GEF, debt swaps and associated NEFs or conservation trust funds are donor-driven finance-raising approaches with relatively few political and technical constraints, are not tied to specific values, and have little or no impact on user incentives. These instruments have tended to focus on forest conservation, when arguably the need has been for multi-purpose forestry in which conservation is incorporated with sustainable use of the resource. Taxes on the international timber trade or other international taxes could provide a basis for area-based payments for NFM, but would depend on international agreement. There would also be major political and technical problems in ensuring the money is effectively spent: this is the main drawback of IFIMs which are not market-based instruments.

Market-based approaches to capturing global externalities

Carbon trading, timber certification, bioprospecting deals, fair trade and marketable FPMOs involve market mechanisms for capturing global public good values. Of these, carbon trading appears to have most potential since it has built up a political momentum linked to the establishment of carbon emission limits. The market would strengthen and transaction costs fall if 'debit' countries are forced into carbon mitigation measures: but the Kyoto Protocol is yet to be ratified, there is uncertainty as to what forestry activities will be included in the CDM, and the market potential for tropical forestry carbon offsets may be less than previously thought (although estimates and opinions vary widely). Carbon trading faces major technical (definitions, measurement, monitoring and enforcement) and political problems, and even the scientific case for it (a positive impact on climate change) remains unproven. Timber certification could hold similar potential to carbon trading in the longer term, but in the short-term it suffers from both a demand and supply problem: the market is 'thin', and temperate countries are best placed to take advantage of it. There are also major technical problems, for example in end product labelling.

However a stronger regulatory approach and better policy environment would provide a major boost to it, as would an increase in consumer discrimination against non-certified timber. Certification also has wider benefits - it can contribute to increased transparency and accountability in the forest industry.

Bioprospecting deals face the basic problem that they target one of the lower use values of forestry, and local forest users seem unlikely to benefit, especially given the technological options of substituting natural compounds. Marketable Forest Protection and Management Obligations are appealing in theory, but face formidable political and definitional problems in practice. Fair trade appears to have more immediate potential if it can survive WTO rules, but will struggle if, as in the case of timber certification, consumers are unwilling to pay a 'green' premium

Channelling finance towards forestry

Given normal financial objectives, until policy and market failure problems are effectively tackled it is unrealistic to expect private capital flows to stimulate long-term forestry. Indeed unless perverse incentives are removed, channelling more equity capital into the sector could make things worse. One area of hope is for new investment instruments based on forestry's potential to supply greenhouse gas mitigation services. Micro-finance to small farmers and community groups taps into an almost forgotten source of finance - rural savings - and can help grass-roots institution building, but does not alter market incentives.

Property rights approaches

The potential of secure tenure or ownership of forest resources may be over-estimated, since it provides no guarantee of NFM without changes in the underlying economic incentives. However, insecure or unclear property rights is a policy failure which discourages long-term investment. Possible priority areas are the promotion of international legislation on intellectual property rights, and encouraging international environmental NGOs to experiment with TDRs - possibly through GEF funds. TDRs face technical and political problems involved in monitoring and evaluation, and at present there is not enough global willingness to pay for them to work, but they could appeal to more adventurous donors (especially multilaterals), drawing in private capital, and previewing stricter international environmental regulations which could create the necessary demand. Only by experimentation can the inevitable problems be tackled and a global learning process started.

9.2 Innovative financial incentives for different types of forestry

Another way of prioritising the potential of IFIMs is to assess the distribution of the benefits or economic values of different types of tropical forestry. Table 3 attempts to show in a rather simplistic way the relative importance of

benefits to different stakeholders in three main forestry situations:

- NFM involving timber and/or NTFPs, mainly considering the higher value forests of the humid tropics (since drier forests have lower taxable values);
- forest conservation, principally to protect biodiversity;
- planted trees, whether in plantations or farm forestry situations.

Natural forest management

For NFM, the main opportunity surrounds the market values accruing to corporate and national beneficiaries. The priority here is to tackle policy failure on both the demand and supply side. Thus improved control over timber supply, especially illegal logging, is an essential complement to appropriate forest pricing and can lead to increased stumpage values. A rider to the emphasis on market values is that community-based NFM requires wider support through compensation of non-marketed benefits since it faces particular financial problems (see Box 1), and its rationale combines social and environmental objectives.

Efforts should also be made to tackle ‘extra-sectoral’ perverse incentives such as tenure legislation discriminating against forested land, subsidies to land-extensive agriculture, and adverse macro-economic policy or adjustment impacts. MBIs like ‘polluter and beneficiary pays’ taxes, which target the indirect use values of NFM, and carbon trading opportunities linked to limited impact felling, increased log utilisation, etc., should complement the above measures. Panayotou (1997b) suggests the North could provide financial incentives for policy

reforms in order to combat political inertia, subsidise high transaction costs and pacify vested interest groups opposing them. Funding possibilities might include matching funds for savings generated by reductions in subsidies, funding the privatisation of state enterprises, improved tax collection systems, the introduction of concession bidding, etc. Until the international regulatory framework necessary for global environmental markets is in place, such an approach could be more cost-effective than promoting global market solutions, but might also run into sovereignty problems.

Forest conservation

Forest conservation or protection projects result mainly in non-market benefits, especially preservation values, which accrue primarily to international and national beneficiaries, whereas local people suffer the highest (opportunity) costs (Wells, 1992). Again many of the problems lie with perverse incentives, and so MBIs are important, but there is also potential for capturing global public values to compensate those responsible for forest protection, including the opportunity costs of local people no longer allowed to use the forest - otherwise conservation may prove unsustainable. The highest priorities here are arguably carbon offset trading - forest conservation is cited as the most efficient way of mitigating carbon emissions; ‘beneficiary pays’ taxes and differential land use taxation; and intellectual property rights. Brazil’s ecological VAT is also worthy of replication. Blunter mechanisms like the GEF, debt swaps and NEFs have an important role to play in the funding of conservation activities, and could be used to provide wider social services and infrastructure support to forest peoples in a ‘contract exchange’ approach to forest conservation,

Table 4. The relative importance of forest values¹⁹ and distribution to stakeholders

	Marketed extractive direct use values ²⁰	Non-extractive direct use values ²¹	Indirect use values (environmental services)	Preservation values (existence and option values)
Natural forest management	+++ corporate, local and national beneficiaries	+ mainly global/national beneficiaries	++ global, national and local beneficiaries	++ mainly global interest
Forest conservation	(-) opportunity cost for local people	++ mainly global and national beneficiaries	++ mainly global/national beneficiaries	+++ mainly global interest
Planted trees	+++ mainly local and national beneficiaries		++ local and national beneficiaries	

¹⁹ The classification of forest values broadly follows that of Lampietti and Dixon (1995).

²⁰ This includes genetic biodiversity value and ecotourism, but excludes subsistence benefits since the emphasis here is on taxable values.

²¹ Ignoring, for the purpose of assessing IFIMs, the habitat, cultural and spiritual values of forest peoples.

as has been encouraged in some European Community financed projects in Amazonia (Richards, 1997a).

Planted trees

For trees that are planted, a prominent view (IDB, 1995) is that subsidies are rarely justified except where there are significant watershed protection benefits, and these should be internalised through a ‘beneficiary pays’ tax. An important priority is to tackle policy failures affecting market returns, for example price controls and bureaucratic marketing constraints (Arnold and Dewees, 1997). However there is also evidence that subsidies play an important role in the early stages of developing a strong plantation sector, and in particular for developing the supportive institutional and technical capacity necessary for small farmers to participate. Since the measurement problems are less contentious than for natural forests (although there is still major scientific uncertainty), carbon trading could play a major role in the future development of plantation forestry.

9.3 Institutional capacity and sectoral reform

This paper has not dwelt much on institutional failure, partly in the interests of brevity. The Costa Rican experiences indicate the kind of national institutional capacity necessary to implement, monitor and enforce IFIMs. Without effective institutions, there is a low absorptive capacity for innovative finance generated, for example, by debt-swaps. Also given that donors only have an indirect influence on domestic policy failure, a sensible strategy is to support institutional change, most obviously by supporting National Forestry Programmes as this can lead to more favourable domestic policies for NFM, as may be happening to some extent in Bolivia.²²

Support for National Forestry Programmes would also increase the likelihood that IFIMs form part of a more holistic strategy including, for example, development of a policy and legal environment favouring public-private partnerships, wider participation in policy development, etc. ‘Information failure’ is usually thought of as a sub-component of institutional failure. OECD (1995) point to the need for improved information, education and public awareness; people are more likely to be prepared to pay more for forestry or conservation when they have a better understanding of why it is needed

9.4 The opportunity cost of innovative financing for forestry

An important consideration is the opportunity cost of using ‘additional’ finance for forestry; Pearce (1997: 405) points out that ‘innovative financing for the environmental sector is not a ‘good thing’ in itself: it is only good if it generates more social well-being than the alternative use of the money would have achieved’. The opportunity cost

may also be in terms of under-investing in more effective policies for achieving the environmental and social objectives sought by IFIMs. This might include investment in human resource development (or other forms of social capital), labour-intensive agriculture, and promoting non-forestry livelihoods as a means of reducing pressure on natural forests. For example, Southgate’s (1988) view of the best way to slow down deforestation in Latin America is to invest in social capital so that the opportunity costs of forest conversion, and subsequent land uses, rises for forest-adjacent people, and (based on statistical analysis) via investment in labour-intensive crop productivity improvements away from the forest frontier.

Econometric evidence also gives weight to extra-sectoral approaches to reducing deforestation: Kaimowitz and Angelsen’s (1998) review reveals that off-farm employment opportunities and higher rural wages make forest-degrading activities less profitable; confirms the potential of productivity increases on land already under cultivation; and warns against poorly appraised investment in roads and other transportation infrastructure, which in addition to facilitating access to forested areas, raises land values and provides opportunities for capital gains, thereby encouraging deforestation. Eliminating subsidies which raise land values and promote land speculation have particular potential (Kaimowitz et al., 1998).

10. CONCLUSIONS

‘Without correction (or at least mitigation) of policy and market failures and with no change in the incentive structure, the financial needs of biodiversity conservation are daunting. The situation is analogous to the effort needed, and energy expended, in swimming against the current: a great deal of energy is expended just to offset the force of the current’ (Panayotou, 1997b:217).

It is argued here that the main reason deforestation occurs is because people find it profitable, and the main causes of this are market and policy failures - including the failure to close the gap between social and private costs and returns and to adequately regulate state-managed resources. At the same time, and by definition, ‘sustainability’ demands that the underlying problems be tackled. It is particularly important to reduce the opportunity cost of forestry, especially by tackling the time or discounting problem.

This points to the importance of market-based instruments, especially ‘polluter and beneficiary pays’ taxes, carbon trading, appropriate forest pricing and performance bonds, although the technical and political constraints to effective implementation of these approaches should not be under-estimated. Among the IFIMs which attempt to capture global externalities, carbon trading may have most potential due to the political momentum being

²²Institutional change in Bolivia has accompanied forest pricing, regulation and concession policy reforms, which had at least temporarily (at May, 1998) resulted in increased ‘precious’ timber prices (author’s discussions with *Superintendencia Forestal*, Santa Cruz).

built up to establish binding emission limits. But the political and technical complexities, not to mention scientific uncertainties, mean that it is not certain that forestry will be included in the CDM.

The other side of the coin to making sustainable forestry more attractive is to make forest degrading activities less profitable or alternative non-forestry livelihoods more attractive (thereby increasing the opportunity cost of forest degrading activities). This approach highlights some of the extra-sectoral causes of deforestation. For example, discouraging land speculation in frontier areas, often associated with new roads, has major potential. Priorities to reduce pressure on the forest include investing in human capital (for example, rural education) and increasing the productivity of labour-intensive agriculture away from the frontier.

A major conclusion is that no IFIM will work without effective regulation and institutions. For every demand-based incentive (carrot), there is a necessary supply-side control (stick): for example, to create sufficient willingness to pay for the global public good values associated with carbon trading, tradeable development rights, certification, etc., binding international agreements are needed; and for appropriate forest pricing to work, control of illegal logging is essential. For example, higher forest product prices or stumpage values also increase the profitability of forest exploitation. Therefore removing a policy failure like a log export ban is likely to increase forest degradation in the absence of effective control. Also markets do not function well unless they are effectively regulated. The difficulties of achieving effective regulation in the face of negative public sector incentives and attitudes should not be under-estimated.

The development of institutional capacity for implementing and monitoring IFIMs (well-illustrated in the examples from Costa Rica) and sectoral reform which can lead to a more favourable policy and institutional environment are high priority areas for donors. The 'blunter' financial mechanisms could play an important role in helping develop the institutional and regulatory capacity for effective IFIMs. A more coordinated strategy between bilateral and multi-lateral donors is also needed, since unilateral donor actions are likely to achieve limited impacts given the range of technical and political problems confronting most IFIMs.

Donors should also recognise that, due to the balance of market and non-marketed benefits, the 'global externalities' approach may have a greater role in safeguarding the 'preservation values' associated with biodiversity conservation, while national policy reforms, complemented by carbon trading and timber certification, could prove more important for natural forest management and tree planting. The 'catch-22' of IFIMs is that the higher potential instruments are more difficult to implement: the policy reforms and market-based instruments necessary to counter policy failures come up against vested interests in the *status quo*, while the greatest technical and political

difficulties lie with attempts to create new markets for global externalities. These problems are highlighted in the current debates surrounding forestry's carbon trading potential. The natural tendency has been for donors to support mechanisms with less political and technical problems, but also with less impact on user incentives and the underlying problems.

Apart from carbon trading, the highest potential may lie with efforts to tackle national level policy failures. However, over-emphasis by donors on the latter raises the sensitive issue of international and inter-generational equity. Donors should recognise that forestry is not usually high up a country's set of priorities and that their influence on national policies is limited except by imposing funding conditionalities. Analysis of the distribution of the costs and benefits of sustainable forestry and of the range of IFIM options for donors implies that there could be a global negotiating table for IFIMs in which donors make every effort to capture and return global externalities (and therefore confront an important aspect of market failure) in exchange for national commitments to tackle domestic policy failure.

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APPENDIX 1 - MULTI AND BILATERAL FUNDS FOR PUBLIC-PRIVATE PARTNERSHIPS

(Sources: Crossley et al., 1996, World Bank communications)

The Biodiversity Conservation Network (BCN) Fund

The BCN was set up with a \$20 million grant from the US Agency for International Development (USAID) to help establish community enterprises in biodiversity rich regions. It is managed by the WWF, Nature Conservancy and the World Resources Institute to provide seed capital to biodiversity linked businesses. According to Crossley et al. (1996), BCN now funds some of best examples of conservation-linked business in the tropics, including the Baining Ecoforestry Project in Papua New Guinea. The BCN funds revolving loan schemes, impact monitoring systems and feasibility studies (grants up to \$50,000) for larger-scale financing. The finance has been used particularly to orientate business development plans to maximise local environmental and development benefits. By 1996, some 20 grants totalling \$12 million had been made to NGOs.

The International Finance Corporation (IFC) Biodiversity Enterprise Fund

This is a venture capital fund for Latin America based on the world market potential for biodiversity businesses, estimated to be worth at least \$30 billion. Using IFC, World Bank and private sector funds, this is essentially an 'early stage fund' designed to offset the high transaction costs of identifying potential deals involving smaller innovative funds, and is also used for developing capital market infrastructure in Latin America.

The Fund for Sustainable Enterprises (FSE)

The FSE is also funded by The World Bank and supports forestry in Latin America by providing multilateral funding that has to be matched in a ratio of 3:1 by funds from the private sector. It is specifically aimed at adding value to the production of cooperatives and marginalised groups, and seeks to establish trading links in which buyers can acquire equity in the producer organisations. The FSE also promotes employee equity, so that marginalised groups can have a business stake.

The World Bank Sustainable Forestry Market Transformation Initiative (SFMTI)

The main purpose of SFMTI is to establish better links with the private forestry sector, but it does not involve a financing mechanism as such. It aims to see how environmental concerns can be incorporated into commercial activities without harming financial performance. The World Bank, together with the MacArthur Foundation, the Harvard Business School, key environmental NGOs, and members of the business

community are bringing together case studies demonstrating how forest sector enterprises have recognised an environmental problem, and addressed it by improving their environmental performance and turning it into a market advantage. These case studies will be used in a series of stakeholder learning fora planned for each region. These fora will identify specific obstacles and opportunities for NFM, and design incentives to overcome the barriers and encourage companies to take it up.

Other initiatives include bringing together international forest industries and environmental NGOs to develop recommendations for NFM and conservation, and a 'Carbon Forestry and Land Use Management Plan'. This will include an evaluation of the policy and related market development issues that need to be addressed in order to gain credibility within the Kyoto process; research on the local economic benefits from carbon trading; and demonstration projects to develop baseline determination, monitoring, certification and carbon offset verification tools and procedures. Finally there is a 'Green Carrot Competition' with prizes up to \$1 million to reward excellence in the private sector. It is hoped that this will give high profile recognition to innovators.