

Economic instruments for tropical forests

The Congo Basin case

Alain Karsenty

CIFOR, CIRAD, IIED



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Centre for International Forestry Research
Centre de Coopération Internationale
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Correspondence should be addressed to:

Alain Karsenty, CIRAD – forêt/ECOPOL, 45 bis, av. de la Belle Gabrielle,
94736 Nogent-sur-Marne, Cedex.
Tel: +33 143 9473 08 Fax: +33 143 9473 11 email: alain.karsenty@cirad.fr

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Instruments for sustainable private sector forestry project
International Institute for Environment and Development
3 Endsleigh street, London WC1H 0DD, UK
Tel: +44 (0)20 7388 2117 Fax: +44 (0)20 7388 2826
email: forestry@iied.org

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Executive summary

Forestry policies adopted by countries in Central Africa rely primarily on government regulation and technical precepts. They have made little attempt so far to use the range of economic instruments, which are often based on market mechanisms, to put a price on forest resources, regulate access to forest concessions or make trade-offs between log exports and local processing. The respective merits of regulation or economic instruments are regularly debated in environmental economics. The best approach consists of examining the circumstances in which these tools are used on a case-by-case basis. Access to information and the potential effects of technological progress, amongst other things, will encourage the use of one or the other. According to these criteria, tropical forestry is in an intermediate position that calls for original, flexible combinations of regulation and economic instruments.

The debate on forest taxation began by looking at the effects of various ways of sharing out the economic rent from forestry on the behaviour of economic agents in relation to forest management. Apart from the fact that definitions of rent vary from one author to another, opinions remain divided about the expected effects, which are closely linked to the institutional and economic context and to the characteristics of individual companies. An empirical approach consists of separating the result in terms of social distribution of rent between the state and the private sector from the incentive effect that the use of various taxes and competitive mechanisms designed to penalise certain practices and encourage others may have in very specific circumstances. This leads to the idea of environmental taxation related to the specific objectives of humid tropical forest management, i.e. reducing logging damage, limiting the areas open to logging and increasing value added through processing.

In Central Africa, as well as other tropical countries, we see forestry taxation concentrated downstream of the industry and in particular on raw wood exports. The “signals” sent out by that tax structure result in the forest resource being undervalued and this discourages operators from investing in practices which would reduce wood losses or adopting innovative processing and marketing strategies. The idea of a single royalty based on the area logged runs into theoretical obstacles – having no direct action on logging methods – and



practical ones, as it is difficult to determine an adequate level that reflects not only the potential value of the resource but also the state of the market. Auctioning logging rights seems to be a more attractive solution, but putting it into practice means clearing various political and practical hurdles, and its effectiveness hinges on the mode of governance prevailing in the country. Royalties based on the volume cut, on the other hand, could subtly influence logging methods, but require effective field monitoring, which is precisely what is lacking. Taxes on log exports, which are easy to collect, serve primarily to provide the Government with financial resources and, secondarily, to encourage local processing. However, they do not fulfil either function very well. Auctioning log export rights, on the basis of a periodic quota, could profitably replace such taxes, while allowing for adjustment in line with market shifts. Here again, this mechanism is encountering political opposition as certain exporters try to maintain the status quo.

Decentralised taxation, giving village communities a built-in right to a fraction of forest taxes, is not synonymous with the automatic establishment of a partnership between stakeholders – operators, administration and local inhabitants – that would allow for negotiated management on the basis of shared responsibilities and benefits. The risk is that such a measure will be seen as simply a “drawing right” on forest rents, without any change in practices, and that it might even lead local people to step up the pace of logging in order to enjoy the highest possible revenues. Here again, the existing mode of governance needs serious analysis and emphasis must be placed more on processes than on merely establishing rights.



Industrialisation of the wood production chain influences forest management, but the relationship between the two processes is ambivalent. Excess investment leading to over-capacity in processing is undoubtedly a danger to the forest and reduces the flexibility of the economy in the face of natural variations, as the experience of several south-east Asian countries shows. In addition, radical steps – such as a ban on log exports – intended to promote industrialisation have often proved to be inefficient in economic terms. The determining factor is value added (high unit value of products using a minimum of raw wood), but the real economic significance of value added is often poorly understood by policy-makers. Policies to support industrialisation must focus on the objective of increasing value added in relation to the opportunity cost of local processing. It is possible to design mechanisms linking taxes and markets that are both flexible – allowing the tool to be constantly adjusted in accordance with policy shifts – and incentive-creating – favouring the most efficient industries – as policy instruments. Alongside an efficient processing industry adding maximum value to the timber resource, log exports can provide the necessary flexibility to adjust levels of off-take in accordance with changes in the resource. Within producing countries, the development – and organisation – of a genuine domestic market for logs is vital for the overall efficiency of the processing industry, while the vertical integration model is not necessarily more appropriate than splitting processing and logging functions between different operators.

Taxation is just one economic instrument amongst many. The existence of very high private discount rates, related to institutional instability and uncertainties over ownership rights, makes it particularly difficult for operators to take the long-term view that forestry nevertheless demands. The challenge in redesigning the “rules of the game” for forestry is to find a way to overcome the natural tendency of operators to “sacrifice the future for the present”, by putting them in an economic and institutional situation that gives them the incentive to manage the natural resource while they exploit it, and to select options that will enhance the benefits from future logging. Certification is one of these instruments, whose purpose is to generate immediate private benefits in exchange for future collective benefits linked to better forest management. The reason why the idea of certification has such resonance is probably that it draws on the altogether contemporary notions of individualism and consumerism, yet it begs the question whether general agreement has been reached over the definition of sustainable management using objectively measurable criteria and indicators. The notion of sustainable management is, however, susceptible to many interpretations, depending on the particular sensitivities of those formulating them. These uncertainties pose a threat to the very credibility of the certification system which can only work if it enjoys the trust and confidence of consumers. Yet confidence and uncertainty rarely make good bedfellows. The way certification currently operates leads to a paradoxical situation where the forests which most need certification (the natural tropical forests being logged) are those where certification is most difficult or disputed, while forests in the North, often industrial plantations under little threat, are certified and drive timber from the South away from the most ecologically sensitive market, redirecting it towards Asian markets.



If we accept that international agreements might be reached to lay the basis for a minimum set of criteria and indicators of “sound forest management”, and for assessing operators’ practices in the field, then we might envision an incentive mechanism along the lines of “performance bonds”. It would seem possible to overcome the weaknesses of certification systems by shifting the emphasis so that practices are sanctioned not at the time of sale but at the time of production, while maintaining the incentive nature that is one of the strong points of the concept. Performance bonds are designed to do away with the divergence between the private interest of operators and the national and global interest in preserving environmental resources. A financial mechanism has been suggested that would offer efficient operators the chance to receive interest on a certain amount of invested capital, as a function of the type of management they practise in their operations. The deposit would be placed with a specialised financial institution (a special fund) offering highly favourable interest rates, thanks to specific funding from the international community. Since the mechanisms of compound interest and discounting are perfectly symmetrical, operators’ financial expectations over several decades hence will change if the interest rate offered for a given term is enough to offset the depreciation of profits over time. Poor performers suffer penalties, deducted first from interest and then from the capital, the amount of which serves to calculate the interest. Good performers will be rewarded with a full share in the incentive system. Setting up such a mechanism

based on multi-lateral co-ordination of the efforts of governments and international organisations or funds would also face the challenge of moving towards the establishment of an international system for forests, i.e. one that shared the same standards, principles, rules and procedures aimed at steering the relationship between “shareholders” in a transnational asset.

The prospective establishment of a market in greenhouse gas emission permits opens up new funding possibilities for forest management. The Kyoto protocol on climate change, in Article 12, envisages the establishment of a Clean Development Mechanism intended to allow funds to be deployed in favour of sustainable development and meet the emission reduction targets negotiated at international level in the most economically efficient way. In order to acquire rights and avoid (or defer) costly technological adjustments to reduce their greenhouse gas emissions, companies could be induced to acquire emission rights by financing operations in developing countries aimed at stocking carbon dioxide or reducing emissions, such as pulp and timber plantations, forest conservation, or “reduced impact logging” projects. However, the real significance of this mechanism for forest projects is still uncertain, in view of the additionality and leakage criteria which are likely to substantially reduce the number of eligible projects.

Conclusion: The lack of comprehensive information and the highly variable context call for the adoption of flexible systems for “guiding” management in the forestry sector, and market mechanisms can provide the answer. The market will sometimes provide the information (such as an operator’s willingness to pay for logging rights to certain tracts, or for the right to export a given volume of logs) that deficient government statistics systems are unable to offer. Wherever possible, market mechanisms should be introduced in place of administered systems, auctions in place of royalties, marketable permits in place of taxes. Care must be taken, however, not to confuse efficiency with ideology: a mechanism may be theoretically efficient, but the economic, political or institutional conditions may not be right for it to work, and serious prior study will need to be undertaken to determine whether it will be feasible in one country or another. All the same, market mechanisms are, and should always be, overseen by a regulatory policy defined and implemented by government, and administrative regulation is still necessary to oversee management practices. Government intervention must be aimed at organising competition where it is needed to encourage innovation and economic efficiency and to establish the operating procedures of markets set up to allocate rights to exploit and export forest resources. This means that governments must acquire the ability to use these economic instruments effectively, which is not currently the case. It would be a tragic misunderstanding to think that the competition needed to maximise the value of forest resources depends on rolling back the state and privatising its main functions. The organisation of competitive markets, and of fair, transparent procedures for allocating resources, implies that the public authorities must genuinely control the mechanisms.

Foreword

The purpose of this document is to examine the likely impact of a number of economic instruments on changing current practices in the management and logging of humid tropical forests, with particular reference to the countries of the Congo Basin, where there are still large areas forested with high-quality timber. The intent is to help reconcile viable, long-term management and a timber industry that, while controversial, remains today, and will no doubt for some time to come remain, an important economic activity in countries that depend essentially on their natural resources, whether renewable as in the case of forests, or non-renewable as with oil and mineral resources.

The paper does not focus primarily on forestry taxation, although this is addressed in certain aspects. Royalties, taxes and other instruments are examined in terms of their incentive potential, and their ability to change practices and choices among one category of economic agents, namely loggers or logger-processors, operating in the forests of Central Africa. Such a focus does not imply that these agents bear a heavier burden of responsibility than other groups for the deforestation that is afflicting the region; this is illustrated by the fact that other large forested regions of the inter-tropical belt are also affected by deforestation even though there is less industrial logging. Nor does it suggest that economic instruments should be limited to forestry enterprises, or that legislation alone will be enough to change popular farming practices that pose a serious problem in terms of conserving forest ecosystems. Locally imposed taxes (on rural markets for example) could represent powerful levers, if they and the revenues from them were properly allocated, for modifying behaviour and redirecting the dynamics of local development, as can be seen in some of the experiments with wood fuel conducted in the Sahel.

But that is not the purpose of this paper. We have chosen to focus our analysis upon the role of economic operators for at least two reasons. The first has to do with the increased pace of industrial investment in wood processing in the countries of the Congo basin, and with the new issues that have emerged in recent years over the relationships between patterns of industrial development, the international timber trade and logging methods in countries of the South.



The second reason is that the massive influx of direct investment from major Asian companies in forestry operations in Central Africa, as elsewhere in the world's dense humid forest zones, is lending new urgency to the selection of suitable government tools and policies. A new context is taking shape, in which operating methods that have hitherto prevailed in the region are changing, and in which it is clear that some operators are interested only in the short term and in maintaining their geographic mobility. In the face of these novel challenges, new and effectively applied laws and regulations are urgently needed for proper management. However, they are unlikely to be enough by themselves, in view of the tremendous pressures exerted on forests by logging activities. New institutional arrangements embracing the introduction of economic instruments and incentives will be needed to influence the choices and behaviour of operators.

The role of forestry taxation needs to be reconsidered in this light. While they are of course a source of revenues for the state budget, taxes and royalties should also be increasingly regarded as a way to encourage operators to amend their practices, i.e. as a form of environmental taxation. But as G. Sainteny (1998) has pointed out, these two objectives are difficult to pursue simultaneously. A choice must be made between the fiscal logic of taxes, where rates are low but the base is broad (thus yielding substantial and continuous revenues), and the environmental logic of taxes that are carefully targeted, where the base is narrow but rates are sufficiently high to be dissuasive, if the goal is indeed to reduce harmful practices (or others that we wish to change). The paradox is that a truly effective environmental tax will yield decreasing revenues over time, which implies that the tax system itself must be designed and applied with continuous adjustments (shifting the tax base) if the volume of revenues is to remain roughly stable from one year to the next. The difficulties involved in the process are clear. This paper does not pretend to resolve them, but rather to suggest some ideas and tools that may be helpful in making such changes.

As regards the methodology used in this paper, it does not see economic operators as an undifferentiated mass but takes into account the fact that some entrepreneurs are genuinely committed to sustainable management, while others pursue more limited objectives. On the basis that this distinction does exist, the paper therefore proposes economic incentives to “reward the good players” and penalise the bad ones. Taking an insufficiently differentiated view, whether positive or negative, of economic operators, would result in a uniform approach to taxation; if their options and the means they use to attain them couldn't be changed, then the only possible objective for the government would be to tax them all at the same rate and rely on regulation to preserve forest resources. That is not the approach taken here. On the other hand, it is essential that all players be subject to the same rules, and that those rules be understood and accepted by all. There cannot be a special institutional framework for each category of operators, although it may be legitimate to give a certain degree of preference to national enterprises.

There remains the problem – and this is not specific to Africa – of the constraints and privileges that governments impose or bestow on businesses to promote development and the objectives of sustainable forestry management. This question arises in particular when it comes to defining support policies for the emerging wood processing industry in the region. The issue of protecting infant industries generally sets intervention-minded developmentalists against economic liberals who are opposed *a priori* to any restriction on the freedom of international trade. Is there room here for a more pragmatic approach? Jacques Giri, in his “*Notes de lecture*” (1998), reviews a work by Anne Krueger retracing several decades of debate among economists about the relationship between trade and development. She pointed out that the theory of infant industries requiring protection is not in itself wrong. The problem is that among the businesses that receive protection, some will treat it as a means to help them become competitive, and will do so, while others will regard it as a comfortable and permanent windfall, and will make no attempt to wean themselves off it. How should we differentiate between these two categories? No one has yet found the answer, and the theory, as J. Giri puts it, is an example of a good idea that proves not to work. Perhaps we shall not accept his conclusion in its entirety, since we do think it is feasible to have some degree of commercial protection combined with a framework of institutional and economic incentives for guiding investment and laying the foundations for developing competition between domestic operators. The limitation on this “composite” approach is, as we are well aware, that it presupposes a firm and enlightened public policy that allows us safely to set aside market considerations while at the same time retaining some of its dynamics and stimulating character.



We are confronted once again with the problem that we cannot predict behaviour *a priori*, when it comes to deciding on a suitable level of taxation, i.e. one that will produce an acceptable sharing of economic rent between operators and governments. In contrast to some other sectors (the oil industry, for instance), where there appears to be general agreement on ways to calculate average production costs and the surpluses generated by exploitation of the natural resource, such an approach is at the present time difficult to follow in the forestry sector in Central Africa. There are several reasons for these difficulties. The diversity of the timber resource in humid tropical forests certainly plays a role, as do the controversial nature of logging operations and the extreme political sensitivity of a sector that is dominated by foreign operators. We should add that many governments in this region have a well-established propensity to attempt to regulate problems of all kinds – often including political problems – by imposing additional taxes, without considering the industry’s ability to shoulder them. The result is a degree of mistrust between the protagonists in the debate on taxation, which makes it harder to establish the real costs and benefits to the industry.

Hence the interest in a “black box” approach. How are we to devise a suitable taxation policy when the players involved retain a strategic hold over the

information needed? There are several possible approaches. One is to lift the lid of the black box and try to blaze a trail through it. Good anthropologists know that the kind of strategic intelligence that can provide the key to understanding social systems can only be gained after long immersion in people's daily lives. The same goes no doubt for economic operators. To discover which portion of the economic rent is actually appropriated by entrepreneurs and which portion is redistributed through various informal channels may be an intellectually gratifying pursuit, but it is also a thoroughly useless one when what is at stake is the very methods by which that rent is shared. There will be no hesitation in detailing the "invisible costs", while the "invisible profits" will be carefully concealed from the expert's cursory gaze.

If we accept that the information gleaned from such an approach will inevitably be biased, then we must reconcile ourselves to the fact that the black box is relatively opaque, and proceed with instruments that are adaptable and flexible, guiding the system down the chosen path, and letting economic agents themselves sort out the level of constraints that is compatible with keeping their economic system viable. The auction mechanism is a good example of how to organise interaction among agents so that they will internalise their constraints and their expectations, as expressed in the level of their final bids.¹ In short, it will force them to adopt the features of the Schumpeterian entrepreneur, often paid lip service but just as often belied in practice.

These methodological choices of course presuppose some theoretical options. In the debate that sets "soft" sustainability (in which natural capital and other forms of capital are assumed to be broadly substitutable) against "hard" sustainability (which insists that global changes are irreversible and that some natural assets are being lost for ever), we tend to come down on the latter side.² In the argument over the sustainable degree of industrialisation in the wood sector, an approach based on the soft sustainability concept could lead to uncompromising solutions (industrialisation without limit and whatever the means) quite different from ours. Those espoused in this paper tend rather to reflect the "precautionary principle", considering that thresholds of



¹ This debate about the difficulty or indeed the impossibility of objectively determining current costs, as well as future costs and benefits in a changing environment, brings to mind the comments of J. Gatty (1998) on the ambiguity of economic calculations designed to determine the cost structure of companies producing public goods in which a "natural monopoly" exists: "(...) costs in economic calculations are marginal costs, i.e. the current costs of present and future expenditure which itself depends on an uncertain future. The marginal cost indicated by a supplier at a given time is what he has decided to be the marginal cost on the basis of what he has decided to be the future. And no data borrowed from any presumably comparable or analogous situation can serve as a reference when cost only exists where there is a choice: as the supplier is the only one able to choose, he is the only one able to say what his marginal cost is" (pp. 75-76). Seen in the context of forest management, this limits the scope of proposals to introduce tax reform on a consensual basis in Central Africa by constructing models of "typical companies" (Carret, 1998) and simulating their reactions to various taxation scenarios. Apart from the inevitable distortions related to the strategic, confidential nature of data on the industry's costs and benefits, which make the results of modelling simply "unfalsifiable", in the way Popper expresses it, the "typical company", an aggregate of the averages of various types of company, will not provide any information on the likelihood of innovation and change on the part of actual entrepreneurs, which results from singular choices and decisions taken in the real world.

² For more detail on these different concepts of sustainability, see Godard (1994).

irreversibility – that cannot be known *a priori* – can be crossed as regards the exploitation of forest ecosystems, and that a number of conservation measures must be taken (e.g. preventing some over-exploited species from becoming too scarce, avoiding opening up the canopy in certain types of forest to an excessive degree), even when scientists are not yet sure how effective such measures may be.

Then there are the more conventional considerations of economic reasoning: radical proposals to give heavy protection to the industry may end up not only jeopardising any possible sustainable management of the forest, but also creating an industrial structure whose sustainability is, in some segments, far from assured. The collapse of entire sections of the Indonesian plywood industry during the crisis of 1997-1998 should provide some useful lessons on this score. Indonesia's forestry industry was established in the 1980s in the expectation of autonomous growth, oblivious to trends in the forest resource, and sheltered behind a system of effective protection produced by low prices for raw wood on the domestic market, as a direct result of the ban on log exports and a policy of low wood prices with minimal royalties on logging. The consequences of this policy – backwardness in terms of technical efficiency, low labour productivity, and persistent product quality problems in most companies – have finally been recognised by the Indonesian authorities, who now tacitly admit that they are the direct result of excessive protection.³ The wake-up call has been loud indeed, and painful for the workers who have been laid off. Its lessons will have to be heeded, not only in Indonesia but in other regions of the South that are about to take strategic decisions shaping their future.



³ "The Party is Over for the Indonesian Timber and Plywood Industry – Interview with Mr. Abbas Adhar, Apkindo's Vice-Chairman", Asian Timber, April 1998.

Introduction

Why should forestry policy, which has traditionally been mainly a matter of regulation, need to resort increasingly to economic instruments such as tax incentives and various types of market mechanisms? A brief aside on environmental policy theory is needed to answer that question.

In economics there are various schools of thought about the most effective environmental policy instruments. One tradition in public economics is to favour the use of regulation because of “market failures”, where the market is unable to impose solutions in the public interest, in particular as a result of potentially important negative externalities (irreversible environmental damage, threats to public health, etc.) and excessively high transaction costs when relying on market forces alone (problems in agreeing on the level of damage, cost of disputes, etc.). Conversely, other theories totally reject resort to government regulation on the grounds that the “regulator” is subject to the influence of pressure groups and that the end result is always the protection of monopolies and squandering of financial resources in seeking to influence government regulatory bodies.⁴



Other schools of thought have tried to take into account both the failures of the market and the failures of the regulator (Lévêque, 1998, who refers to the new public economics and institutional economics of regulation), preferring a more empirical approach in dealing with problems on a case-by-case basis. We should note that, in most of the literature, analysis is illustrated by examples relating to pollution, where reference is made to flows (specifically, various types of discharge into the atmosphere or water) whose source can easily be identified and whose impact is measurable (on the basis of the amount discharged). We shall see that, as regards tropical forestry, measuring the impact of logging is much more difficult, bearing in mind not only the lack of knowledge about ecosystems (which can eventually be overcome through research) but the many types of interaction between the various phenomena

⁴ This is the stand taken by one of the main proponents of the theory of “public choices”, G. Tullock. For a detailed presentation of debates about the various schools, see Lévêque (1998).

(especially interaction between the ecosystem and human societies), which mean that we must think in terms of probable processes and not just direct measurable impact.⁵

Nevertheless, the incentive effects of economic instruments are immediately attractive to economists, who must also consider the overall costs of achieving the environmental objective. Unlike regulations, taxes allow companies the choice of not changing their practices (at least not in the short term) and paying the corresponding amount, thus avoiding (or deferring) expenditure on complying with environmental standards. Of course, the company's decision will depend on the total cost of complying with standards (referred to in the literature as the marginal cost of cleaning up pollution) in comparison with the amount of the tax. The same principle applies to so-called "right to pollute" mechanisms, except that this is a market mechanism, rather than a tax whose amount is set by the administration, establishing the unit cost of the consideration the operator must pay to maintain certain practices. The other theoretical advantage of taxation lies in its incentive effect, especially when information on cost structure is unavailable and the characteristics of companies are very diverse. Indeed, if standards are the chosen instrument, operators will tend to meet the standard without seeking to exceed it, even if they are technically and financially able to do so. In the case of taxation, operators for whom the marginal cost of improving environmental performance is lower than the amount of tax will improve their performance until this marginal cost and the unit amount of the tax are on the same level. As in the case of "right to pollute" mechanisms, the tax here makes it possible to enhance the status of the environment or to reach the chosen objective at a lower collective cost since the least costly activities are undertaken.



In an attempt to summarise the various constraints and potential of environmental management tools, the State Planning Commission (in France) has produced a chart on the use of regulation and economic instruments (Table 1.1).

Let us consider the management of tropical forest resources in relation to this analysis.

- Drawing up a joint agreement on sustainable management and the mechanics of deforestation is certainly a topic for debate between private operators, governments, forest research and ecological organisations. Definitions broad enough to achieve consensus refer to maintaining the functions and services

⁵ The debate on the "causes of deforestation" is a good example of the difficulty of taking "measurements" in interacting processes. The currently practised selective logging, as everyone agrees, has only a limited **direct** role in deforestation (i.e., according to the FAO, *conversion of forest land for other uses associated with density [of forest cover] below 10%* – Singh, 1993), but opening up forests and establishing access roads for the purpose creates some of the conditions for further agricultural encroachment (see Barbut et al., 1995). In that case, allocating "percentage responsibility" to logging or indeed to farmers looks like an attempt to find a scapegoat rather than have to think through a complex phenomenon.

Table 1.1 Use of regulation and economic instruments		
Influences/ Circumstances	Favourable to the use of regulation	Favourable to the use of economic instruments
Central issue	Establishing a joint agreement	Allocation of a scarce resource
Number of agents involved in allocation	Low	High
Access to information	Common knowledge	Asymmetric information Strategic bias
Shape of damage curve	Steep slope Presence of thresholds	Slight slope No thresholds
Heterogeneous characteristics of agents	Low	High
Expected effects of technical innovation	Low	High
Expected effects of standardisation	High	Low

Commissariat au Plan, 1993, in Faucheux and Noël, 1995

provided by the forest, but the difficulties begin when it comes to establishing to what extent these functions may be altered within the bounds of supposedly viable management and what degree of transformation of the structure and specific composition of the forest is acceptable. The difficulty in achieving joint agreement is an argument in favour of regulation, but the problem of allocation of forest resources between economic agents through the mechanism of distributing logging rights is also fundamental and would justify the use of economic instruments to ensure that the allocation is effective.

- The number of agents involved in the allocation of forest resources is relatively small in comparison with the number of users of ground water, for instance, but it can vary considerably depending on access to the mechanism for allocating resources (international auctions, mutual agreements, etc.). In the countries of Central Africa, the total number of loggers varies (450 authorised operators in Cameroon, but fewer than a dozen in the Central African Republic). On the other hand, there are considerably fewer processors with their own logging areas, perhaps several dozen in a country like Cameroon and only a few in countries like the Central African Republic or Equatorial Guinea.
- Access to information is affected by many asymmetries and substantial strategic bias. In Central Africa, the gradual halting of the major inventories undertaken by governments and forest research in the 1970s and 1980s has limited the quantity and quality of available information. Operators have

information on the worth of their past or present concessions, which they are careful not to share with their competitors. Information relating to the profitability of logging or processing activities is confidential and seen as highly strategic by companies, inasmuch as it can constitute a basis for negotiating tax reforms with the authorities.

- The slope of the damage curve will vary depending on the type of forest, as some ecosystems are more fragile than others (mangroves, forests in mountainous areas, etc.). There are undoubtedly thresholds of damage, but these are difficult to establish precisely in view of the lack of knowledge about the complex operation of tropical forest ecosystems.
- Economic agents have quite divergent characteristics, related to their economic clout, training, perception of risk, time-frame of objectives, products manufactured and commercial networks of which they are part. The arrival over the last few years of Asian operators from industrial conglomerates with a wide range of activities – whose pace and methods of working are unlike those of other operators – has increased this diversity.
- The effects of technical innovation are potentially important. Remote sensing techniques, GPS (Global Positioning System) apparatus and Geographical Information Systems (GIS) greatly increase knowledge of the resource and the effectiveness of inventories. Use of GPS and GIS helps to establish the best layout for roads and skid trails, reducing the influence of roads and the damage caused by hauling operations. Apparatus to analyse the quality of standing timber using ultrasound is in course of production and may bring about a substantial reduction in on-site abandonment. There have been remarkable advances in manufacturing techniques that, when put into practice, can substantially increase value added and allow new products to be manufactured. Processes to extract energy from waste can increase the profitability of industrial processing, for example by providing the necessary energy for dryers. Finally, if the cost could be brought down, the use of helicopters to pick up logs in the forest (as happens in some areas of Asia and the Pacific) could considerably reduce the damage caused by logging by replacing the heavy haulage equipment currently employed. The fact that these technical innovations, some of which have been available for a long time, are only adopted very slowly and sometimes with difficulty by many operators is a serious argument in favour of enhanced use of economic instruments to encourage speedier introduction of technical progress in logging and industrial processing.
- With regard to the anticipated effects of imposing standards, these remain uncertain: gaps in knowledge on some important aspects of how ecosystems function (such as regeneration or the role of fauna/flora interaction), make it rather unlikely that management of logging by means of standard criteria will become widespread. The fact that there are very distinct forest ecosystems in tropical areas (evergreen forest, semi-deciduous forest and so

on) also makes it difficult to apply very general, standards which do not take these differentiations into account.

We can see, therefore, that an examination of the situation of the timber industry in tropical countries in the light of each of these criteria does not throw up any clear prescription and that the use of either regulation or economic instruments will demand a more in-depth analysis of the circumstances and objectives of forest management on a case-by-case basis. We shall see that, as in other sectors of economic life, combinations between regulation, standards and economic instruments will be needed if there is to be any hope of achieving the desired result of sustainable development.

Sharing the economic rent from forestry

2.1 Definitions

Pricing and taxation policies are important tools for the management of any renewable resource. Resources of this kind, such as timber taken from natural forests, do not constitute industrially produced goods, even though there is a cost to procuring and transporting them, and there is a market that sets prices for raw wood. Economists traditionally considered that the difference between the market price for a natural product and the costs of bringing it to market (factor payments, wages, interest on capital and profits) represented an economic rent, “a free gift of nature” to the landowner.⁶ In tropical forestry, it is the government which is both the forest manager and the landowner, and it derives revenues from a number of different instruments: forest royalties (proportional to the area of the logging concession), stumpage fees (based on volumes cut), and other taxes such as those on exports.



Our approach to pricing and revenue systems takes account of two dimensions: incentives and taxation. The discussion of the issue of “capturing economic rent from forests” takes place within this context. The notion of rent is not intended exactly in its conventional sense, but rather refers to the proportion of profits in excess of average rates of return from a comparable investment in other economic sectors. This is the concept of Gillis (1988) and Bomsel *et al.* (1996). It fits nicely with the definition of economic rent found in the *Dictionary of Economics* (Penguin, quoted by Champagnat, 1997), or the difference between the return derived from a factor of production and the remuneration needed to keep this factor in its same use.⁷ Several modern English-speaking writers have expanded this definition and tend to identify forest rent as the *potential* market value of the standing timber (Repetto, 1998; Vincent, 1990), whether realised by the logger; left standing by selective cutting or because of silviculture rules; or destroyed by logging and extraction

⁶ This is Ricardo’s concept of the rent from land.

⁷ This reflects Alfred Marshall’s notion of rent as synonymous with “producer’s surplus”.

operations or by inefficient processing. Hyde *et al.* (1991) go further by including in rent calculations the cost of maintaining and renewing the resource (silviculture, surveillance, plantations etc.).⁸ In this paper, we shall stay with the first definition of economic rent, leaving aside definitions based on standing timber value, since these seem to beg another question about the “*full* economic value” of the natural ecosystem

2.2 Distribution

Some authors, such as M. Gillis (1992), see in the objective of “capturing rent” (for the state) a means of limiting the propensity of operators to act with a “rent seeking”, short-term focus. This, by definition, inclines them to mobility of a kind incompatible with the long time horizon essential in the forestry industry.⁹ By stretching the return on investment over a longer period, heavy taxation can foreshorten what many renewable resource economists consider to be the most risky period, where the equipment has been paid off and the operator is less sensitive to possible penalties such as fines, cutting volume restrictions, or even the loss of his concession. Other studies in south-east Asia (World Bank, 1991) found that the easy profits from logging were one of the major reasons why operators failed to undertake proper planning for their skid trails, which, it has been shown, can reduce logging damage and hence promote regeneration, while reducing operating costs by cutting equipment running times and distances covered. The small proportion that such gains represent in total annual profits (just 3 to 8 %) supposedly dissuades operators from making the initial investments in training their personnel and acquiring space and time planning skills.¹⁰ According to the authors of the World Bank study, a reduction in short-term profits should induce operators to look more systematically for productivity gains, whether in the course of logging or in the processing of the wood. If the goal of maximising profits over a long period is the operator’s only guiding principle, then a reduction in short-term profitability should lead operators to conclude that it is in their interest “to invest in trees” and to select operating methods that will minimise waste and will hold out the promise of a healthy second cut.

A different point of view is put forward by Bomsel *et al.* (1996) whose analysis, stressing the government patronage system existing in Central Africa, suggests that a large part of forest rents in Africa should go to wood processors in order to protect these infant industries. This bias in favour of integrated

⁸ For a summary of the definitions and uses of the idea of forest rent, see Champagnat, 1997.

⁹ Some authors also stress the increased demand for logging concessions that arises from the fact that profit levels in the forestry sector are higher than they are on average in other activities. (Repetto, 1988). Most point to the downstream risk of low efficiency in the wood industry linked to a “cheap log policy” (D’Silva & Appanah, 1993), resulting from the state’s failure to capture the forest rent, and the consequent ability of loggers to supply their mills at low prices. We shall return to this last point in some detail.

¹⁰ A World Bank study in Malaysia (1991) noted that loggers, taking the typical attitude of “free riders”, prefer to wait for the government to make the investments needed to train their personnel, rather than pay for this out of their own pockets.

operators (loggers-processors) is based on a conviction that they will be more inclined to manage the resource properly if they have a longer-term investment in it.

Most of these arguments, whether in favour of having the state capture all the rent for itself or transfer some of it to the processing industry, suffer from the fact that they take only partial account of the parameters that affect operators' decision-making processes, where the variety of situations, constraints and objectives (and their different perception of risk) makes it difficult to lump them into a single category. To focus solely on the objective of capturing rent (understood here as excess profits) is likely to lead to divergent practices which may be diametrically opposed. After all, what is there in common between an African logger working with a minimum of capital under a small two-year concession, a European logger-processor whose business methods and future outlook are heavily stamped by the family origin of his firm, and the south-east Asian operators for whom forestry is but one branch of business for a powerful conglomerate that is traded on Asian financial markets and has a worldwide business strategy?

Redistribution in favour of the state and at the expense of the operator (high tax rates) will thus have no *predictable* influence on the practices of operators *as a whole* (everything will depend on the context and the many parameters that may be completely specific to the operator). As evidence of the ambivalence of high taxation, it is clear in West and Central Africa that many European companies during the 1980s abandoned the positive logging practices and forestry management (such as planning road and skid trail networks) that they had used in the past (Karsenty and Maître, 1993).

The discontinuation of these practices probably has to do with the sharp decline in their profit margins, linked to low prices for timber during this period, which would seem to indicate, in contrast with the above-mentioned situation in south-east Asia, that apparently similar causes (excess profits on one hand, falling profits on the other) do not always produce the anticipated mechanical effects.¹¹

Similarly, the idea of transferring a large portion of the rent to processors takes no account of the divergent characteristics of wood industries, whose needs are not necessarily compatible with the constraints of renewing the resource; it also ignores the mobility of capital in a context where the investment cycle and the resource renewal cycle are very different.¹² Like Champagnat (1997), we might provisionally close this debate on the influence of rent sharing on forestry management by citing this pragmatic opinion: "*It is an empirical question, however, whether the national economy and poorer local populations gain*

¹¹ Since mid-1990, in the light of a more favourable economic situation, various logging companies in Central Africa have taken on forestry experts to improve their planning.

¹² Note as well that the more rent is captured by industry, the shorter is the return on investment timeframe and (*ceteris paribus*) the greater is the incentive to over-exploit the remaining resource and transfer capital to another geographic area or another economic sector.

*more from private harvests, private rent capture, and re-investments, than they would from the Forestry Ministry's resource management and rent capture. How much would private interest reinvest locally, how much would private operators transfer to secure accounts overseas? Alternatively, how much resource rent would the Forestry Ministry dissipate in hidden personal transfers, excess employment, poor financial management, and insufficient environmental awareness? How much would be lost in incentives for concessionaires to trespass, high-grade and disregard off-site environmental values?"*¹³

The capture of economic rent from forestry would seem to be more a question of the social distribution of profits from forestry activities than an incentive factor for better forestry management. One might think, however, that since the state today is legally in charge of forest management and is responsible for long-term undertakings like silviculture, the quality of that management will in the end depend on the share of the rent that it can capture, assuming that the state takes its forestry management obligations seriously and devotes sufficient money to it, i.e. that it has a clear political will. Within that framework, and with these reservations, the price and royalty system could, depending on its configuration, have an influence on forestry practices and contribute directly to enhancing forest management. Governments have so far paid little attention to this incentive dimension, and have instead favoured the system that offers the greatest assurances of revenue, such as export taxes.

¹³ Hyde and Sedjo, 1992, page 348.

Forest management in Central Africa

3.1 Economic objectives

Generally speaking, most of the parties involved in forest management, whether public or private, are agreed on the following objectives with regard to logging operations:

- a) Limit the areas open to logging, so as not to encourage interaction between forestry and the advance of commercial farming;
- b) Promote logging practices that have the least impact on their surroundings;
- c) Encourage the development of an efficient processing industry (minimising the waste of raw material) geared towards value added products (processing as far along the production chain as possible);
- d) Enhance the forest sector's contribution to GDP so as to promote job creation.



Some of these objectives may appear to be contradictory, such as a) and b).¹⁴ To avoid this contradiction, we might suggest an additional objective, although it is more controversial,¹⁵ viz: increasing to some extent, and in some forests, the ratio of cutting to surface area by **expanding the range of harvestable species** to make up for the size limitation on logging areas. This move, if

¹⁴ The idea behind (a) is that loggers will compensate for these limitations and increase their harvest on remaining areas (intensification) while still selecting the same most commercially valuable species (risking the overexploitation of such species), taking smaller diameters and minimising the number of trees left in the forest. Reduced impact logging (RIL) guidelines recommend, among other things, to leave some mature trees of such species to favour regeneration (avoid cutting all harvestable trees in a given area). If the volume harvested has to remain equivalent over time, RIL might lead to an increase in the area opened to exploitation, unless loggers are able to diversify their harvest.

¹⁵ Rietbergen and Poore (1995) are sceptical of the effect of broadening the range of species cut, given the increased damage that would be caused by more intensive logging. Greater opening of the canopy could also have negative ecological consequences in some forests. They conclude, however, that an increase in the harvest of lesser used species could have either a positive or a negative effect depending on the type of forest and the management methods actually employed. They cite in particular the importance of an annual cutting quota, if expanding the range of species cut is not to lead to an increase in the area logged.

properly applied in the field, could also help to meet other resource management goals such as maintaining a certain number of commercially valuable species within a cutting area so as to **ensure their regeneration by conserving seed trees**. This recommendation is made by many silviculture experts (and found in many sets of sustainable management criteria), but it is very difficult to implement at present given the very selective nature of logging (an average of one tree per hectare), which would force loggers to reduce drastically the number of trees cut on each concession if they are to meet this criterion without expanding the range of species in their cut.

3.2 The taxation dimension – current situation and problems

The situation in Central Africa can be summarised very roughly as follows:

- low levels of royalties (the price of access to the resource), collection difficult;
- royalties based on volume cut, theoretically indexed to the price of timber, but in practice lagging behind; revenues low for lack of controls;
- high taxation on raw timber exports, with a high rate of recovery;
- moderate taxation on the export of processed products.



Since the tax on the export of logs is the easiest to collect, most revenues come from this source. This tax is based either on market list prices, which are supposed to reflect the FOB value of the wood, or directly on the declared FOB¹⁶ value of the shipment. However, in reality, these are unlikely to match up, since the documents submitted by exporters will not necessarily reflect the real price of the deal between the exporter and the buyer, both of whom may have the means of settling their accounts outside the country. As to “integrated” operators (those that have processing facilities outside the country), internal transfer statements (purchases/sales by profit centre) are virtually unverifiable.¹⁷

In short, this system will not help the government to earn the revenues it is entitled to expect, after leaving a “normal” profit margin (comparable to that earned in other economic activities) to the various operators. An optimal royalty system should tend to maximise government revenues, while allowing for “normal” returns to capital, and maintaining the operators’ investment

¹⁶ FOB – Free On Board – refers to the wood price after payment of taxes in the port (but excludes the export tax, which is calculated on the FOB price). It is generally calculated after the wood has been loaded onto the vessel, except in Africa where FOB price is calculated before loading.

¹⁷ Since 1997, Cameroon has adopted international FOB values, computed each quarter by species by SGS and Reuters networks, as the sole basis for taxation. In this case, there is no longer an opportunity for undervaluing the price of the deal, since the tax is based on an external “fixed point”. However, the operators have obtained a 15% discount on the international FOB value, arguing – with some reason – that this FOB reflected only the higher quality price (LM quality) and not the average commercial value of logs usually exported from Cameroon.

capabilities. Yet in the context of a volatile commodities market based on exploitation of a renewable resource (of uncertain potential), royalties and taxes are not very flexible as tools (Rettig, 1989) and consequently they are poorly adapted for achieving this optimum.

3.3 The incentive dimension of current pricing policies

By pricing policies, we mean government action to place a value on standing timber resources (cf. Grut *et al.*, 1991). This generally involves **royalties** (that must be paid for the privilege of logging the forest) based on the size of the concession or on the volume of wood cut.¹⁸ These represent a cost for the operator. They can be set by regulation (administered prices) or they may be determined by public bidding for logging concessions.

The incentive dimension is too often neglected in pricing policies, and it often seems technically easier to implement a simple tax on exports that will earn revenues for the state. Yet it is one of the key ways of influencing the behaviour of economic agents directly without relying solely on regulation. Currently the royalties system affects behaviour in the following manner:

- the low level of acreage-based royalties (the price of access to the resource) contributes, along with other factors, to encouraging operators to seek large concessions (up to the maximum limit allowed by law, which can in any case be circumvented by spinning off new companies), and to cut too selectively;
- this policy of low-cost access to forest resources does nothing to encourage economising on raw material, whether during cutting operations, hauling and stocking, or processing. The rate of on-site abandonment, which is high in Africa, combined with low wood recovery rates and a poor co-utilisation record (reclamation and use of offcuts) are good indicators that the resource is viewed as endless – and there is no pricing policy to send operators the kind of signals that would discourage this view;
- the taxing of log exports sends conflicting signals: on one hand, it is supposed to discourage exports in this form by providing an incentive for further processing locally, which would suggest that it is successful if revenues from it decline (!); on the other hand (and this is the reverse side of the same problem), it seems to be held at an “acceptable” level, so as not to dissuade log exporters and thereby cut off the state’s main source of revenue from the forestry sector. This compromise between the two objectives

¹⁸ The term “tax” is generally defined as a mandatory fee, payable with no direct counterpart (Barde, 1992). It should be reserved here for export or import duties levied on forest products. Sometimes the distinction between a tax and a royalty is based on how the proceeds are to be used: in the case of a tax, the revenues will be paid into the state’s general budget, with no specific allocation, whereas with a royalty, the proceeds may possibly be earmarked for a special fund. This destination-based distinction between royalties and taxes is not, however, a general rule.

explains why log exports are still so high (2 million cubic metres of logs were exported from Cameroon in 1997, more than 60% of the timber produced, and 2.7 million from Gabon, 90% of timber offtake), despite the declared goals of governments (Cameroon **intended** to halt the export of logs in June 1999¹⁹ and Gabon is restricting exports of raw wood to ensure rapid development of domestic processing).

¹⁹ In the end Cameroon decided to implement only a partial log ban, leaving open notably *ayous* (*obeche*) exports, the main harvested species, with a higher export tax burden.

Basic principles of a pricing and taxation policy

4.1 Prices and externalities

Prices are supposed to indicate the relative scarcity of a good. This principle, a staple of classical economics, is especially pertinent for renewable natural resources that are not produced but are removed for a price roughly equal to their extraction cost, and that may disappear if the rate of offtake exceeds their regeneration capacity. Currently prevailing prices for the resource do not reflect the direct costs of renewing the forest ecosystem.²⁰ Nor do these prices (the cost of accessing and exploiting the resource) reflect the status and trends of the stock in Central Africa, and in particular they take no account of indirect costs relating to *public goods*: the loss of biodiversity, of non-wood products, the release of CO₂, etc. These are referred to as externalities, because the market does not take them into account; they have no price, therefore, in the sense of trading value (the intersection of supply and demand), even though their social cost is considerable (soil degradation, climate change to varying degrees, extinction of species, etc.).

One way of filling (or reducing) this gap between social and private costs is to make economic agents pay for the external costs they generate, by means of a “tax”, a generic term that encompasses taxes and royalties as defined previously. This is what economists call “internalising externalities”, one of whose most well-known applications is the “polluter pays” principle. This does not mean that the amount of taxation according to the “polluter pays” principle is equivalent to the difference between the private and social costs (that would mean following the logic of compensation along the lines of insurance). It would be difficult to make an accurate calculation in the case of



²⁰ Direct renewal costs, which may represent new plantations, silviculture operations or supervision and control, where natural regeneration alone is relied upon.

forestry. Attempts to assess the total economic value of an ecosystem remain basically academic exercises, whose methodological bases are much disputed,²¹ and there is in practice limited scope for using them to determine tax systems. The fact that externalities vary in nature and can often not be aggregated or assessed in money terms makes it impossible to enter into the logic of “compensation”²². Internalisation through taxation provides an incentive in the sense that it sends a signal to users (in this case loggers) “that the social cost of [their] action is not confined to the price of commercial transactions involving the environment” (Lipietz, 1998).

The cost of producing wood and its selling prices on various markets do not reflect these externalities. The role of environmental taxation is precisely to take them into account, to “internalise” them, either by penalising practices that should be changed (a high tax rate and a narrow tax base, the typical features of an environmental tax), or by imposing lower tax rates (but with a broader base, in line with normal taxation logic) on operations as a whole and using the funds collected to finance renewal works and to compensate for degradation of the environment.

4.2 Resource acquisition pricing and the degree of value added

The pricing system should encourage economising and upgrading of the resource (greater value added with less wood). In broad terms, there are two possible scenarios: low acquisition costs for timber may reflect either its low quality (low market value) or a price system that is not working (very low royalties).

- In the first case (low quality), an increase in acquisition costs may cause the operation to be abandoned, but it may alternatively lead to greater efforts to add value (save wood) and, if there is a suitable market, to manufacture finished products (furniture, doors, cabinet work) where the market price is much higher than the value of the wood that goes into them. Greater value added is not, however, incompatible with a low acquisition value for the resource: an example can be found in the furniture made in south-east Asia from *hevea* wood, which has made notable inroads in Western markets. This

²¹ Cf. Lescuyer, 1998. One of the most controversial aspects of some so-called “contingent” assessments that claim to put a figure to “existence values” (the value attributed by the public to the existence of a good even when they make no direct use of it) is the reduction of the perceptions of the most diverse societies to a monetary standard articulated by a public made up of concerned individuals able to order their preferences on the same scale of values. From this angle, it is immediately obvious that there is no place for the different perceptions of the forest that other stakeholders, such as the “local populations” as they are commonly known, might have.

²² Another objection to this theory of “symmetrical compensation” was voiced by Coase (1960), who considered that such symmetry (amount of tax = amount of damage caused to third parties) would move away from the economic optimum, which can only be achieved, according to Coase, through bilateral negotiation, but this debate is beyond the scope of this book (see Faucheux and Noël, 1995, and Lipietz, 1998).

wood, the acquisition cost of which is low because it has already been amortised by the production of latex, has hardly any market in its rough processing stage, but lends itself very well to the manufacture of low to medium quality furniture.

- If resources are of higher quality (high market value) and their acquisition cost is low, there will presumably be a rent created by the sale of different products, even those that generate little value added. This opens the possibility that some operators may be content to act as rent takers, with no incentive to upgrade the resource. Here again, this does not exclude other operators from working out their own strategies to add value (see box below).
- A rise in the acquisition cost (assuming it is still within the bounds of market realities) cuts or eliminates the rent received by those operators who are least efficient in the way they produce and process their wood. It is possible, here again, that some operators may react by ceasing their operations, but their numbers should be lower than in the preceding scenario (lower quality resource). Others will seek to maintain their profit levels by economising on wood and increasing its value added.

Box 4.1 An example of a value-added strategy linked to a forest management plan

Some forestry companies in Central Africa have attempted to enhance the efficiency of their operations in the face of new costs linked to the implementation of a forest management plan. This example shows how, without necessarily increasing offtake, it is possible to achieve greater value added for harvested timber.

[In Gabon], "the Thanry-CEB company has invested in a modern sawmill. With a capacity of more than 1000 cubic metres a month, it is fed primarily by cull left behind from export operations, and by wood that is damaged in cutting and for which no [other] use can be found. The start-up of this mill thus has little impact on overall offtake in the forest. On the contrary, it makes good use of wood that was formerly simply left lying in large quantities on the ground. A further advantage is that the recovery ratio from cut timber has improved considerably (...). The average volume of logs has thus risen by 10 to 20%, which has facilitated development and has reduced operating costs per cubic metre of wood."

B. Demarquez, CEB Development Office, *Canopée* no.11, 03/98.

4.3 Problems in setting royalties and taxes at realistic levels

The level of royalties and taxes should bear a relation to market conditions, and the real prospects for operators to upgrade their product. If royalties and taxes are set too high, they will make the products uncompetitive. Because markets and production capacities are not fixed (depending as they do on commercial dynamics and the pace of technical innovation), the pricing and taxation system must be adaptable to these variations: if prices and taxes are set too high, they will pose a handicap for the entire industry and will jeopardise its prospects for sustainable management; if they are too low, the state will lose needed tax revenues and it will be sending the wrong signal to the industry, allowing operators simply to collect rents using strategies that require no particular innovation or efforts in favour of better forest management or adding value to forest output.

The pricing and taxation system must be compatible with the country's prevailing institutional circumstances. But prices and taxes are *structural* economic instruments: they are intended to transform the economic and institutional environment, in keeping with a country's stated objectives (in this case, development, conservation of its natural heritage, and the encouragement of domestic operators)²³.

With these principles in mind, let us look at the different possible options, with their advantages and disadvantages.



4.4 Options and objections

4.4.1 A single levy on operations

A study on forestry taxation in Central and West Africa conducted for the World Bank (Grut *et al.*, 1990) called for a replacement of the current multiplicity of forest levies with a single, annual royalty based on the area of the concession or on the estimated FOB value of the wood contained within it. This idea addresses directly the concern that the price of access to the resource should reflect the commercial value of the wood. Since the price (the total of all levies) is paid entirely at the upstream end of the production chain, it will guide operators' choices regardless of the stage at which the wood is used. Moreover, this concentration of levies at the upstream end may be of particular interest for Central Africa:

²³ In terms of public finances, the general principle of fiscal neutrality implies that the sole purpose of a tax is to raise revenues in the most efficient manner, to the exclusion of any other objective (the "neutrality" principle, Barde, 1992). The trend towards "environmental taxation" assumes a certain redefinition of the functions of taxation, and a break with this concept of neutrality.

- increasing the cost of access to the resource should push operators to limit wood waste at every stage of the operation and to “economise” on the resource by processing it more efficiently;
- linking the price to the size of the concession encourages operators to intensify their cut on the lands allotted to them. This intensification is bound to lead, in one way or another, to an expansion of the range of species removed, and should provide operators with an incentive to seek new markets and new uses for particular types of wood.

4.4.2 Disputed advantages

There are some arguments in favour of moderate area-based royalties in Central Africa. One such argument is that to make development profitable, build processing facilities and turn long-term rotation into a feasible option, operators would need to have vast areas available. Raising the forest area unit costs would lead to a reduction in the number of large concessions, which would be an obstacle to development and sustainable management.²⁴

This argument is based on the assumption that the characteristics of forestry operations in Central Africa are changing very slowly if at all. Yet a rise in area-based royalties, increasing the cost of acquiring the resource, is likely to offer an incentive to reduce wastage and loss of wood at site level by means of more comprehensive and careful inventories, efforts to reduce wood losses on cutting, stricter management of wood lots and so on. This would apply in processing as well: recovering non-exportable parts of logs (thick ends and heads, parts split on cutting, etc.); increase in recovery rates for the main products (sawn wood, veneers, plywood, etc.); increased utilisation of by-products (mouldings) and waste (including for energy production); and preference for greater value added production (furniture, wood flooring, industrial carpentry products, etc.). It is possible to rationalise management of cut timber in this way without greatly changing the level of forest offtake, which is an important point.

More active efforts to find outlets for some “secondary” species may also be encouraged by this increase in area cost, especially where offtake is very selective. This would mean a degree of intensification of offtake, which must be compatible with the characteristics of the forest concerned and, in any event, carefully assessed on the basis of regularly updated management plans.²⁵ Increased offtake, however, is not the only way to offset this shift in the tax system: the value created by the company on the basis of a given volume of wood depends on the effectiveness of its processing methods, the type of product manufactured, the productivity and quality of its labour, its ability to

²⁴ Noted by Chaudron (1997) in connection with debates in Congo-Brazzaville at that time.

²⁵ In addition, the problem presents itself quite differently in coastal areas where the proximity of ports encourages quite substantial offtake (often several trees per hectare) and in distant and rather isolated regions where forest resources are most abundant and average offtake rarely exceeds one tree per hectare.

meet the needs of the fastest-growing markets, finding new outlets for unfamiliar species or new products and so on. In short, the issue must be couched in economic rather than physical terms, which would imply a shift in perception for many operators – and observers – who are accustomed to reasoning mainly in terms of volume cut.

The CERNA study (Carret, 1998) criticises the increase in area-based royalties as follows “[Economists favouring such an increase] do not think that the annual area-based royalty merely encourages increased yield per hectare, but that it also provides an incentive to reduce the areas logged annually. This only holds true if the operator can make the same profit by logging one hectare as he used to make by logging three hectares; only if this condition is met can an annual area-based royalty act as an incentive. For this to happen, *the operator must increase his yield by a minimum factor of three*. Now, and this is the crux of the problem, to increase yield by a factor of three, he must cut i) logs of lower quality than those he cut before and ii) species he did not cut before” (p. 137 – author’s italics). Here we have a fine example of reasoning that makes no distinction between the value processing may add and the volume cut.²⁶

Finally, it remains unproven that concessions have to be very large in order for management to be sustainable. The idea behind criticism of raising area-based royalties upstream is that a large processing facility which was supplied only from its own concession might find itself with excess capacity if it had to reduce its supply area following a sharp rise in royalties. According to this objection, the operator would be tempted to reduce rotation in order to maintain the flow of logs for processing, which would prejudice sustainable management. However, a model other than that of a processor relying (almost) exclusively on his own concessions can be envisaged. Dissociating processing functions and concessions (contrary to some current legislation) would clear the way for the development of a genuine domestic market linking the supply and demand for wood. In this scenario, the fact that average-sized operators/loggers sell the wood they harvest to a limited number of complementary, specialist processing units (thereby benefiting from economies of scale) does not in itself conflict with sustainable management.

4.4.3 Predictable problems with increasing area-based royalties

Although a simple step on paper, an increase in area-based royalties faces “operational constraints” that cannot be ignored, two of the main ones being:

- Problems in determining the level of the annual royalty. Without complete inventories, a forest’s potential commercial value is very difficult to estimate,

²⁶ In addition, we can see that one of the logical conclusions of this approach is that area-based royalties should be markedly lower in coastal regions (so as not to increase over-exploitation) than in distant regions (where increased offtake raises fewer problems and may even be desirable). As logging taxes are usually higher in coastal regions than in the hinterland, this could result in somewhat muddled signals being sent to operators.

given the variety of species it contains. This suggests that the royalty should be set in terms of the concession area, bringing us up against the same constraint of lack of information, with the key point being the risks associated with an arbitrary treatment of the different operators – requiring them all to pay the same royalty, regardless of the commercial potential of their concessions.

- Collection difficulties. Since it is impossible to ask operators to pay the access price up front, (the cumulative commercial value of harvests must be determined over a long period of time), partial (annual) payments must be allowed. Yet while the first instalment, giving the right to access, will surely be paid, it is likely that some operators will claim financial distress (real or invented) in order to delay subsequent instalments and in the end to escape them entirely. The threat of job losses could provide a very effective argument in dissuading governments against further taxes.

4.4.4 Determining value through bidding procedures

Given the difficulty of making an *a priori* assessment of the value of a forest concession, and with a view to finding a price that reflects real market conditions and is compatible with operators' actual capacities, the World Bank has put forward the idea of letting concessions through tender or auction procedures (Sharma *et al.*, 1994).

The **advantages** are these:

It allows a market mechanism to set the price of access to the resource.

The burden of assessing the potential is transferred to the operators themselves, who must take steps to do so (commissioning surveys, using plant stratification data, drawing on their prior familiarity with the area, etc.). In the presence of competition, the price of a concession will reflect the maximum financial possibilities of the operator who has the best “industrial equation”, taking into account the estimate of the resource, the value-added prospects for a broad range of species, marketing networks, industrial know-how, anticipation of market trends, risk perceptions, etc., and will at the same time allow the state to earn the maximum revenues compatible with operators' possibilities.

The **criticisms** levelled at this proposal are many; some are more pertinent than others:

It ignores investments already made (processing facilities).

Industrialists will be afraid that competitors could take over forest resources close to their own mills, and might then covet the mills as well. This argument is not groundless, but it is of limited applicability: transferring ownership of processing facilities between operators may not always be fair to the initial investor, but is not necessarily at odds with sound operating practices. The

criticism would seem above all to be an argument against allowing new operators into the market for concessions (especially since Asian operators have appeared on the scene). A supplementary point used against bidding is that such a system would raise the level of insecurity among operators with mills in the forestry area and would dampen investment. This argument, while it is again reasonable, can cut both ways: legislative provisions and economic systems cannot be left untouched simply for the sake of preserving the security of one class of economic agent.

Cameroon has found a formula that, on paper at least, looks like a possible compromise between using market mechanisms (awarding concessions on the basis of sealed bids) and fairness to investors by introducing a kind of “pre-emptive right”. Forest Management Units (*Unités forestières d’aménagement*, UFAs) are allocated through bidding, with a floor price, but if the owner of a mill located within a UFA fails to win the tender he has the right to obtain, or retain, the acreage concerned if he submits a new offer equal to the highest bid.

There is in fact a way to improve the situation for the industrialist under this procedure without abandoning the idea of competition among operators. This is to adopt a kind of “Vickrey” auction (named after the Nobel economics prize winner in 1996), which awards the concession to “the best offer, at the second-best price”, i.e. the highest bidder wins, but pays a price only as high as the second-best bid. This rule solves one problem (from the seller’s point of view) that recurs during bidding transactions, which is the tendency of bidders to offer less than they would actually be prepared to pay for the good being tendered. In a “Vickrey” auction, because he knows that he will only have to pay the second-highest bid price, each potential buyer has an interest in declaring his “real” price, i.e. the maximum amount he is prepared to pay. Regardless of how competitors behave, “each bidder’s position is never worse, and may be better, if he declares his true offer” (Guyer, 1996).

Introducing this variant, with a floor price, would also help the industrialist’s position, since **he can exercise his pre-emptive right, not at the highest price offered, but at the second highest**, which may in fact be his own.²⁷ This may also be a way of countering the predatory bidding strategies that may arise under the pressure of competition.²⁸

Domestic and small-scale operators may be excluded.

In Cameroon, many feel that such a system would give the advantage to large-scale operators who are in a better position to place high bids, and that it

²⁷ This means that there must be at least three bidders if the system is to operate in a truly competitive manner: if the industrialist who is already in place has a pre-emptive right at the second-best price, and there are only two bidders, all he has to do is make an offer at the pre-set floor (if there is one) in order to come out the winner.

²⁸ This type of auction does not in fact provoke bid inflation, as one might expect, given that each bidder knows he will have to pay not the price he has offered, but only the second-best bid. The risk that at least one other competitor will adopt the same behaviour (an inflated bid) will dissuade each participant in the auction from over-bidding, knowing that in the end he risks having to pay the price offered by a competitor who has the same strategy of exaggerating his bid and coming in second...

would cut out local African operators from exploiting their own forests. This is an objection to take seriously, in that it reflects the viewpoint of those Cameroonian parliamentarians who voted in 1993 to amend the forestry law, against the advice of the government and donor agencies. From a technical viewpoint, nothing stands in the way of splitting concessions and reserving a portion of the forest for exclusive logging by national operators. That, at any rate, was the solution adopted in Cameroon for allocating a number of forest management units (UFAs) in 1997. The overall impression of there being a discriminatory tool remains, however, and will be difficult to overcome. It may also be pointed out that affirming the legitimate goal of defending domestic operators' rights can sometimes be used as a cover for perpetuating patronage practices that would be impossible under more open and transparent procedures.

A handful of well-financed operators may be able to seize monopoly control.

One thinks immediately of Asian operators, whose expanding presence in Africa is generating concerns, for a variety of reasons, about the future of forest management. The implications of this objection are not entirely clear, however. At this point in time, there is nothing to suggest that their practices in the field will be any worse than those of other operators,²⁹ which makes this argument somewhat untenable.

It is difficult to generate competition.

The small number of major operators who can compete for large concessions (fewer than a dozen in any country) may tend to encourage collusion among them to circumvent or corrupt the bidding process. There are techniques for frustrating such attempts at collusion (Dutch auctions, for example, with a secret reserve price), but their effectiveness may be diminished by the small number of participants and their degree of mutual familiarity. Nor can the risk be ignored that operators will simply boycott the process, since they cannot readily be replaced.

The arrival of Asian operators could change this situation. Their financial clout, however, is already a source of concern, and expanded use of bidding procedures could hasten their entrenchment. Some local operators express nervousness at this prospect, and at the same time they point out that Asian operators have shown little interest in forestry management to date.

The following conclusions flow from this discussion of concentrating royalties at the upstream end of the industry:

- The idea is interesting in principle, but implementing it may pose difficulties, particularly when it comes to instituting a bidding system indissociable from the establishment of a price approaching the commercial value of the

²⁹ Cf. Debroux and Karsenty (1997). With the exception, perhaps, of the speed with which Malaysian operators do their logging, which tends to exhaust the merchantable potential of a forest more quickly, and their geographic or inter-sectoral mobility that is the counterpart to this strategy.

resource. It would seem reasonable therefore to increase the weighting of royalties based on access to the resource within the total tax take (while keeping that take constant), without, however, making it the primary feature of forest revenue collection.

- Auctioning cannot become the sole channel for access overnight. It might be desirable to introduce such a system, but only gradually and in a few areas at a time, especially in those where there are few existing processing units. This approach will allow for testing the reactions to it and the influence it may have on the resource price. (The resulting level of prices could in fact provide a good indicator for the proper level of royalties on other areas of production forests).
- Economic instruments only have value and acquire potential effectiveness when institutional conditions are favourable to their use. In Cameroon, the way some of the 26 UFAs were allocated through a bidding process was strongly criticised by observers, raising the issue of the selection criteria against which bidders are assessed.³⁰ A good tool cannot, simply on the strength of its intrinsic virtues, hope to resolve problems related to modes of governance which determine the appropriation and use of the precepts of (sound) economic policy.



4.4.5 Royalties by volume or the number of trees removed

Royalties of this kind are (or should be) directed more at providing incentives than at raising public revenues. Their advantage is that they allow differentiation among forest species and can (if set at a low or zero rate) encourage the cutting of species less valued by loggers.

Another advantage of this kind of royalty is that its level can be shifted depending on transport costs per cubic metre, thus tending to reduce the inherent advantage of exploiting a coastal or easily accessible area. The following table (4.1) gives an overview of the incentive dimension of various forms of royalty (generally referred to as taxes in government parlance) used in this area.

We shall focus here on two proposals, one based on the value of the standing timber (SV), and the other on the volume of raw wood entering the mills.

³⁰ Simultaneous assessment of technical criteria and the value of the bid in the procedure adopted in Cameroon encourages “subjective” judgement, whereas simply taking into account the financial aspect of the bid would ensure transparency and avoid challenges. Technical criteria (including promises to establish mills or infrastructure) are indeed very important, but should be a factor in selection (shortlist of candidates meeting minimum criteria) and not in allocation (which should be based only on the, objectively measurable, value of the bid). Even then, financial commitments (such as paying annual rent) may not be honoured if the operator has sufficient political clout to evade sanctions.

Table 4.1 The incentive dimension of forest royalties

Forest royalties	Advantages	Disadvantages
Uniform, based on volume cut	Easy to implement	<ul style="list-style-type: none"> • Encourages under-reporting of volumes cut • High incentive for creaming³¹ and only logging accessible stands
Based on volume cut, but differentiated according to species and location	<ul style="list-style-type: none"> • Limits incentive to cream and take the most accessible stands; • Allows consideration of the relative scarcity of the various species; • Tries to base the royalty level on economic and not simply physical values 	<ul style="list-style-type: none"> • Requires sustained, accurate field monitoring by the forestry administration
Per tree	<ul style="list-style-type: none"> • Simple principle limits chances of cheating: can be verified ex-post by a stump count; • Wide potential variety of rates in terms of location and species; • Discourages cutting young trees (minimum trunk diameter can be enforced more easily); • Encourages minimising damage to residual stand and maximising use of trees (if royalty applies to broken trees too) 	<ul style="list-style-type: none"> • Requires a sound inspection system that can only come from the forestry administration • Encourages cutting of large trees, which may denude the canopy and cause changes in species make-up of the stand
Based on standing volume estimated by inventory	<ul style="list-style-type: none"> • Limits tendency to cream (since royalty is based on marketable volume and is prepaid); • Suitable for capturing major share of rent • Royalty is pre-paid 	<ul style="list-style-type: none"> • Heavily dependent on quality of inventories • No particular incentive to limit damage to the residual stand
Based on total market value of harvest	<ul style="list-style-type: none"> • Can be a good rent capture tool if rate is high enough • Limits temptation to cream 	<ul style="list-style-type: none"> • Less simple than the per-tree system • No particular incentive to limit damage to the residual stand

³¹ This is a form of logging, also known as high-grading, where only a few valuable species are harvested

Table 4.1 (continued)		
Forest royalties	Advantages	Disadvantages
Based on the stumpage value (SV) harvested	<ul style="list-style-type: none"> • Tax burden varies with market conditions and efficiency of processing (recovery rate) • Can be adjusted per species and to reflect transport costs and market conditions • Limits temptation to cream • Compensates at least partially for cost differentials related to distance from point of sale 	<ul style="list-style-type: none"> • Requires a sound information system on wood prices and recovery rates and a tax administration that can react quickly (regular SV reviews) • Can become complicated if applied to composite processing (products incorporating several species) • No particular incentive to limit damage to residual stands
Based on volume entering the mill	<ul style="list-style-type: none"> • Encourages economical use of raw material and maximum value added in processing • Can be adjusted per species • Applies even if logs are cut illegally • Reduces number of control points (there are fewer mills than logging camps) 	<ul style="list-style-type: none"> • Level of fee cannot be changed to reflect location of stand • No impact on operating practices • Collection risks linked to difficulty in stopping production process in case of non-payment of taxes
Based on volume milled (if log export is prohibited)	<ul style="list-style-type: none"> • Easy to introduce • Applies even if logs are cut illegally • Favours vertically integrated businesses by deferring tax payment downstream 	<ul style="list-style-type: none"> • Discourages technical innovation since fee is exports generally based on average of physical recovery rates (control is on output, not input) • Provides no incentive for sustainable logging (uniformity, etc.)

Stumpage value (SV)

The stumpage value (the value of the standing timber) is calculated by deducting from the FOB price of a product (e.g. sawn *sapelli* timber) the total of operating, sorting, processing (if any), transportation, and port handling costs. This value may be calculated with or without forestry taxation. A “normal” profit margin and an investment risk premium (both measured by convention) are also deducted from the residual value to calculate the final figure. Clearly, calculation of the SV is similar in spirit to the definition of economic rent given earlier in this paper. It differs, however, to the extent that economic rent is a **ratio based on total capital invested**, while the SV takes account only of **direct costs** for the species exploited. The SV plays the same role as gross margins in agriculture: it allows us to measure and compare the contribution of each activity (and each species, in the case of forestry) with the profits of the business. The SV also allows us to set the standard for a system of differentiated cutting royalties, depending on the species involved and the distance to port.

SVs can be nil or negative. One of the key variables is the transportation distance: the greater it is, the more risk there is of a negative SV. Moreover, since the processing costs of the wood are considered as a whole, without

Box 4.2 The SV formula (excluding taxes)

FOB price per m³ of logs or processed product for a given species
[minus] operating costs per m³ of logs or roundwood equivalent of the
processed product
[minus] processing costs (in the case of a processed product)
[minus] transport costs

= potential gross profit margin net of taxes

[minus] “normal” profit margin for operator*.

= SV (net of taxes).

* Duscheneau and Méthot (1993) proposed an agreement for Cameroon whereby the normal profit margin would be 50% for logs, and 70% for processed products, including an industrial “risk premium”; this must be negotiated between the parties, if the SV is to play a role in determining taxation levels.

There are other formula variants giving different results. One of these calculates the normal profit margin on the basis of “FOB price minus operating costs per m³ of logs or roundwood equivalent of processed product”. This method was used by J. Aubé (1996) for the Congo, proposing a “normal” trading profit of 40%. The variations in the results, depending on the method adopted, suggest that SV calculations should be used to “set the standard” for taxes, rather than to determine their exact values.

distinguishing between wages, inputs, or machinery depreciation (three elements that are treated differently from the value-added standpoint – gross or net), the SV of processed products is often lower than that of exported logs (see for example the CIDA study on Cameroon, 1993).

With a royalty calculated on the basis of SV, we can compensate for an unfavourable geographic location, and strike a partial balance between forestry activities in different parts of the country. The incentive effect can be significant, if the recovery rate used is a **national average, and not the actual rate achieved in the companies**. Let us suppose that the SV is calculated on the basis of a company's real wood recovery rate and that, after new investments are made, the recovery rate rises. If taxes are levied proportional to the SV, then the more efficient processors will see no benefit from their efforts, from a tax viewpoint, since the SV will also rise. Conversely, processors whose recovery rates are below par will have a lower SV and will escape with paying less tax.

Cutting royalties indexed to the SV may provide incentives for enhancing the efficiency and scope of processing activities, if the physical recovery rate adopted for calculating the SV is a **single rate for all companies**, based for example on the national average. Under this hypothesis, companies operating at an efficiency level higher than the average will see a tax advantage, while the less efficient processors will be penalised by this method of calculating the SV.



Finally, an SV-based royalty system can work only where forestry output consists of simple products, raw wood, and primary or secondary processed products, using essentially one species. As soon as products become more complex (for example, plywood made of sheets from different species, multiple-species particle board or composite furniture), use of the SV quickly becomes too cumbersome for it to be practical.

Royalty based on raw wood entering domestic sawmills

With most countries in the region eager to reduce the portion of output exported as logs in order to promote/increase further domestic processing, funding agencies fear that, given the current structure of forest royalties, government revenues will suffer from a shift away from exports towards domestic processing. Thus, the World Bank has proposed that a fee be levied on logs entering the sawmills. This could be adjusted depending on the species, and could provide an incentive for better utilisation of the raw wood. We would point out that the royalty would lose a portion of its incentive nature in terms of forestry practices themselves (since only a fee per tree cut or destroyed can take this dimension into account).

To reduce the risk of fraud, such a system presupposes very strict and regular controls at the factory gate, but this should be feasible. If the timber company has its own mill and processes all of its production, the system will still make sense. On the other hand, if the processor draws his raw material from several

sources, it is he who has to pay the royalty. This is not a problem (on the contrary) in terms of yield and collection of the royalty, but it overlooks logging practices entirely, i.e. the whole incentive dimension. We might also expect collection problems in this case: what inspector will have the required authority to shut down a mill and put hundreds of people out of work because of unpaid royalties?

4.4.6 The seeds of an environmental tax?

Cutting royalties contain the seeds of a true environmental tax, inasmuch as they can be used selectively (depending on species and distance to port) and can build in qualitative elements (they can be charged on all trees destroyed during cutting and hauling operations). In this case, they represent significant progress over uniform royalties or taxes.

Yet cutting royalties cannot really play this role, because of the trade-off, reflected in their current low rates, between various objectives. In Cameroon, the cutting royalty was set for the 1998 budget at 2.5% of the FOB value, expressed per logging area and per species. In Gabon, it represents 2 to 10% of the “*plage*” value (the value of the wood delivered to shore), depending on the zone; in the CAR it is at 5% of taxable value, and in Congo-Brazzaville 3% of FOB value. Setting rates low but over a broad base (all wood is taxed, although at different rates) reflects purely budgetary considerations. In fact, operators see these taxes as simply additional costs of doing business, and they have little if any incentive or dissuasive effect. Royalties will have to be much higher, more targeted, (for example on certain coastal areas, or on certain carefully selected species), and offset by the removal of those that play a purely “budget-enhancing” role, before any real impact on logging practices can be expected. In other words, a narrow tax base but high tax rates would be needed, while keeping the overall tax burden unchanged.

The main problem, however, with this type of royalty collected on the ground is recovery which depends on officials often working alone, far from their home base. In Cameroon, the cutting royalty is collected by the Ministry of Finance on the basis of what the operators declare. Field controls of the tax collection by forestry officers are practically nonexistent. A substantial increase in the weight of some of these royalties in the overall fiscal burden could lead to more instances of attempted fraud. Before these royalties can really be used as an environmental tax tool, there will have to be some improvement in the forestry surveillance services.

4.4.7 Export taxes or permits?

As noted earlier, export levies are the easiest to collect (no payment, no sale) and here, in principle, opportunities for fraud are the fewest. For these reasons, it would seem advisable to have them play a significant role in any taxation system. The main problem is to determine the appropriate level of tax: if it is

too high, it will discourage exporters, while if it is too low, the government will lose revenues. This problem can be avoided by replacing the tax with a **market for export permits**. Let us take a common case: the country that places quotas on the allowable volume of log exports (a global quota, fixed in advance). By selling export rights at public auctions for fixed quantities of logs (individual quotas that operators must purchase), the level of royalties will rise to match the financial capacity of the most efficient operators, and in line with market conditions.³²

Auctions can in fact be held throughout the year, which will allow the tax level to be adjusted regularly as market conditions swing back and forth. This system was used in Côte d'Ivoire, from 1983 to 1996, whenever log exports were authorised. It also served to fund the budget for the public logging company, SODEFOR. Prior to 1983, quotas had an entirely different purpose: for each m³ processed, the processor obtained the right to export one m³ of logs, and this was a way of encouraging local processing.

Putting these export permits on the market, at a price set initially by the government (and one that can vary thereafter according to market conditions), the delicate problem of the initial distribution of export permits can be avoided. As Barde (1992) notes, the distributive implications of such an approach – the sale of permits – in contrast to simply assigning them free, are significant: there will be a financial transfer from operators to the government. But this comes back to the logic of export taxes, the only difference being that the latter are not a very effective way of collecting economic rent, given the inability of governments to determine their optimal level (here, this means the rate that will capture all the rent without depriving operators of their “normal” profit margins).

To avoid predictable perverse effects (e.g. operators over-cutting one species in order to fill their quota), quotas should be **transferable** (a quotas market), so that operators can adjust their quota needs to their real output. **Market values** for unit export rights could thus be set, by species and quality (the unit could be one m³); these could change in keeping with international market prices, and would provide governments with a valuable indicator of market shifts. Transferability would also help to soften the effects of sudden price shocks: if operators had acquired permits in advance and could no longer find markets for the wood they expected to export, they would be able to put those rights back on the market and thus recoup a portion of their investment once a new equilibrium price for the permits was established. In the reverse situation (where prices are rising), permits acquired previously help to amass profit margins.

³² In this scenario, the auction system theoretically allows the state to collect the entire portion of the economic rent attached to the export of logs. Operators may however benefit from economic rents (sectoral excess profits) in wood processing.

There are hardly any technical problems with such a formula, as opposed to the allocation of concessions by auction. Nonetheless, a transparent market for these export permits would have to be established, i.e. there must be a specific marketplace, market rules and regulations to ensure proper functioning (with the possibility of recourse in case of dysfunction).

From the viewpoint of the other “distributive effects” of such a system (who will “win” and who will “lose”), it might provoke opposition among some domestic stakeholders, who might see in this formula a threat to the revenues they earn from exporting logs, an activity that is still often more profitable than selling them on the local market.

4.5 Policies on earmarking fiscal revenues for village communities

Some countries in the region have decided to use a portion of forestry revenues for direct or indirect funding of village communities. We are not speaking here of the “communes” (local councils), which are decentralised public institutions, but rather of communities (villages, hamlets) that generally have no well-defined legal status. These initiatives are interesting in principle, since they reflect a concern to redistribute the revenues of timber operations to people who are too often excluded from any share in those benefits. Yet, while these revenue allocation initiatives are too recent to permit an accurate assessment of their impact, we must be careful not to create rights without corresponding obligations, as we try to share out responsibilities for forest management.

Merely adding a line to the budget guaranteeing communities the right to a portion of forest taxes is not synonymous with instituting an automatic partnership between stakeholders (operators, administration and local inhabitants) – such a partnership must still be established, and made to work. The risk is that such a measure will be seen as simply a “drawing right” on forest rents, without any change in practices, and that it might even lead local people to step up the pace of logging in order to enjoy the highest possible revenues. The best approach would be to link this partial fiscal redistribution to a process of negotiation among the parties, aimed at determining the rights and duties of each one in exercising joint (participatory) responsibility for forest management units. Use of the receipts could be decided by mutual agreement, and this would also allow operators to become involved in those social or development activities for which it is agreed that they will retain responsibility, and those that could be funded from fiscal revenues earmarked in advance for the benefit of the villages. This clarification of roles would be even more desirable, since operators complain, and with justification, that local communities often have excessive expectations of them in terms of social activities, while at the same time they must pay new taxes that are supposed to finance local development.

In short, these earmarked revenues may represent a powerful inducement for the development of negotiated and contractual management initiatives among stakeholders, and may be a factor in structuring and empowering local communities where traditional authority has sometimes become diluted. This, however, is on condition that governments encourage the **processes** of negotiation, participation and contractual formalisation, rather than instituting general and automatic distribution that will not bring about any spontaneous change in behaviour.

The question of industrialisation and its relationship to forest management

There is interaction between the industrialisation of the timber industry and forest management, but this is ambivalent. Excess investment leading to over-capacity in processing is undoubtedly a danger to the forest and reduces the flexibility of the economy in the face of natural variations, as the experience of several south-east Asian countries shows. In addition, radical steps intended to promote industrialisation often prove to be inefficient in economic terms. The determining factor from this point of view is added value (high unit value of products using a minimum of raw wood), yet there are few studies giving facts and figures on this issue. Intelligent policies to support industrialisation must stick to this criterion and focus on the objective of increasing value added in relation to the opportunity cost of domestic processing. Flexible, incentive-creating, innovative mechanisms linking taxes and markets could be designed as policy instruments.



5.1 The economic dimension

Local processing promotes broader development of forest resources, by allowing more species to be harvested, as opposed to the hyper-selective practices of “creaming” that require the “consumption” of far too much space in comparison with the volume of wood cut.³³ In Côte d’Ivoire, where most forest output is processed locally, the range of species utilised is much broader

³³ This does not mean, however, that local processing of one or a group of species will reduce demand for them: in Ghana, cuts of *odoum* (*Milicia excelsa*) and African mahogany (*Khaya spp.*) were higher four years after a ban was placed on their export as logs (in 1979), while their forest numbers had declined considerably (IIED-Ghana Forestry Department, quoted in Sharma *et al.*, 1993).

than among its central African competitors, thanks to the development of processing industries; however this broadening of the range may have more to do with the fact that the virtual disappearance of top-value commercial species is turning attention to more plentiful remaining species (see box, “Continued depletion of Côte d’Ivoire’s forest resources”, in chapter 6).

Yet if industrial units do not improve their recovery rates (the ratio of the volume of processed product to the volume of input required), the local processing of logs that were previously exported will lead to wastage of natural resources, since more raw wood will be required to obtain the same processed output than is the case in the more efficient plants of Europe. In Indonesia, where the physical recovery rate for the major export product (plywood) averages 50% (or generally higher than the rates found in the same industry in Africa), the World Bank estimates the volume of wood lost each year at 3 million m³, because processing efficiency is below regional standards (World Bank, 1992).

An administrative measure such as a ban on log exports causes the price of raw timber to drop at home, by cutting off foreign demand. Falling log prices will clearly not encourage operators to invest in modernising their processing units, or to upgrade or economise on raw material. In short, efficient industries cannot be created by decree – they must be built up gradually on the basis of a competitive market that may (also) help to manage natural resources more effectively.

5.1.1 The question of value added

In economic terms, we often hear it said that wood processing is a source of “value added”, and that it thus helps to raise producing country income while creating new local jobs. In fact, it all depends on what kind of processing we are talking about. There is no doubt that finished products (furniture, windows, etc.) are sources of value added. The prices of these goods depend directly on the functions that they offer the consumer and on their aesthetic appeal, and sometimes these prices are only remotely related to the material that goes into the product.

But does this hold true for semi-finished products such as sawn timber, plywood or veneers, where the price is set on world markets as in the case of raw materials? This is where recovery rates come into play, along with the respective prices for logs and the semi-finished product. Without going into the economic details, one can see intuitively that if it takes 2.85 m³ of logs to make 1 m³ of plywood (or a recovery rate of 35%, which is common in Africa), we can hardly speak of value added unless the selling price of the semi-finished product is at least 2.85 times the price of a cubic metre of logs. In a free market, i.e. where domestic prices correspond to international market prices, it will be easy enough to determine whether processing is generating added value

or not. If by-products are utilised (mouldings, for example) their value should be added to that of the finished products.

Value added has a precise economic definition: it is the value of output less that of intermediate inputs consumed. By intermediate inputs, we mean goods that are actually consumed in the production process. French national accounts take account only of the gross value added, which includes amortisation of productive capital. To measure the value actually created by any branch of industry (where the value added by the productive capital is already accounted for under another branch), we must look at net value added, i.e. we must deduct from the value of output not only consumables, but also annual fixed capital consumption. Generally, however, this value is not known: it is not to be confused with amortisation, which is merely an accounting convention for tax purposes. It is precisely because it is so difficult to determine the real useful life of each company's machinery, and hence the rate of annual consumption of fixed capital, that national accounts pay attention only to gross value added.³⁴ In countries where all of the productive capital for the forestry industry is imported (whether we are speaking of logging equipment, processing machinery, or timber trucks and heavy vehicles to transport wood), this information is important, since the country's economy will derive little benefit from this portion of gross value added (except through any import duties levied on productive capital). Annex 1 gives a calculation of value added by the "log exports" and "processed product export" activities of a forestry company in Central Africa.

Moreover, estimating value added not at single industry level but for the nation as a whole means taking account of the spillover effects of activity in an industry.³⁵ In the case of Central Africa, it is essentially in the transport area that we find such spinoff.³⁶ Other spillover effects are weak at the present time (productive capital and most consumables are imported) and may be disregarded when calculating value added.

Looking in turn at the export of processed products and of logs, and taking gross value added as the basis for comparison, we see that a large part of this added value is created in processing and transport, in the first case, and transport in the second (shipping logs increases the transport component).

³⁴ In France, the total of gross value added is considered to be about 13% (on average) greater than it would be if measured on a net basis (Piriou, 1987).

³⁵ There is an economic evaluation method for this called the "effects method".

³⁶ In south-east Asia, these spillover effects are probably more important, although we know of no detailed studies on the subject. At any rate, the 1997-1998 crisis in the region has revealed that, in a country like Indonesia, spinoff from the forest industry was perhaps less significant than might be thought: the collapse of whole sections of the Indonesian plywood industry was accelerated not only by the abrupt contraction of markets, but by operators' inability to pay for imports of glue and spare parts (which were still being imported despite 23 years of determined industrialisation), given the massive devaluation of their currency and the freeze-up in the banking system. This finding is not peculiar to the forest industry, and it explains why "emerging" Asian countries that have devalued their currencies heavily have not been able to revive their industrial exports, because the mechanical rise in the price of imported intermediate consumables has paralysed output.

Distance thus plays a major role, and accounting conventions lead to a paradox: a greater distance to port, and higher transport costs to the operator, will not produce a proportional decline in value added, since about 70% of transport costs consist of wages, taxes, profits and depreciation (cf. Laurent, 1994, who was looking at Cameroon), and are thus included within gross value added... Taking net value added into account (deleting annual fixed capital consumption, which here would be the wear and tear on trucks), and how it changes depending on distance, would no doubt bring us closer to the operator's perspective, since it is he who has to pay the transport costs.

5.1.2 Accounting for conventional value added as reflecting an economic opportunity cost

Since the purpose of this document is to suggest economic instruments that will enhance the management of forest resources, we propose using a concept of value added as an opportunity cost to compare the wealth gained by the country from different, mutually exclusive options. What is the amount of additional wealth contributed by making one m³ of plywood within the country, compared with exporting the quantity of raw wood needed to make it? To answer this question, without having at hand all the information for calculating the net value added of each option, let us take a "generic" value

Box 5.1 The "generic" value added contributed by primary processing

Value of one m³ of processed product – (Value of one m³ of raw product / wood recovery rate)

Suppose that the FOB price of one cubic metre of a particular species is \$150 (in log form), and \$350 as veneer, and that the recovery rate is 50%, then the value added by processing would be $350 - (150/0.5) = \$50$.

This value added is close (but not quite identical) to what accountants call gross value added, i.e. it includes depreciation of machinery and transport vehicles, in addition to wages and profits assigned to processing or transportation. Furthermore, it is applied at national, not company, level: from the national point of view, it does not matter whether the value added appears in the transport sector or in the farming and forestry sector. In contrast to a strictly accounting approach to value added, which would treat raw wood as a consumable good, the value of which would be equal to the logging cost (if the industrial unit has its own wood supply), this conventional definition refers to the opportunity cost principle in economics.

We have taken here the example of a primary processing product (sheets of veneer) where raw wood is the main consumable good, leaving aside the fuel and lubricants needed to run the lathe. For plywood, a secondary processing product where the veneer sheets are glued together, it is legitimate to delete the glue as well, which is a very important item in this activity, generally second to the raw wood, but sometimes ahead of wage costs.

added contributed by domestic processing of the wood. This “generic” value added is not very different from the gross value added used in accounting, but it is designed with a very specific objective in mind: to make a rough comparison of several options and to provide the starting point for a tax mechanism that will encourage more economical processing of wood (see chapter 6).

The situation becomes more complicated when price distortions appear that tend to differentiate the price of logs on the domestic market from that prevailing on the world market. Let us return to the example of a producing country that puts a ban on log exports because it wants foreign buyers for its semi-finished products rather than its raw wood. This ban is very likely to cause a substantial fall in the price of logs within the country introducing it. From the accounting viewpoint, local processing will probably lead to value added in the processing industry, if the calculation is done using **local** prices for logs and **international** prices for the semi-finished product. An economist, however, must in all cases consider the international price to determine whether one activity is producing more wealth for the community than another might. In many cases, it could be shown that the value added likely to show up in analytical accounts arises from price distortions caused by a heavy tax, or *a fortiori* a ban, on log exports.

In such a situation, it is not clear whether the **exclusive** processing of raw wood brings a country more income than a mixed solution that includes both some processing and some log exports. If the processing activity encourages the development of related activities (glue-making, assembly of production tools, etc.), it is possible that incomes generated by this broadening of the industry will compensate for the losses inherent in the fact that logs are being processed inefficiently when they could have been exported at greater profit. But if none of the inputs required for processing can be produced locally, and instead have to be imported, then it is likely that local processing of the entire wood harvest will lead to a loss of earnings nationally, as the recent example of Sabah shows.

The Malaysian state of Sabah (in north-eastern Borneo) gave a major boost to the price of logs on the international market in 1993-1994 by banning log exports at the beginning of 1993. It has now once again started to allow such exports, and has authorised a level of 2 million m³ for 1997 (which is equal to the entire output of Gabon). Among the reasons that led Sabah to reverse the ban must surely have been the fact that earnings from forestry exports fell 30% following the ban. The industry association has vigorously opposed the move, but the authorities justified their decision by pointing to the estimated US\$160 million in **additional** revenues expected from the export of raw wood.³⁷

³⁷ The World Bank estimated in the early 1990s that each job in the wood processing industry generated by the log export ban adopted in Peninsular Malaysia was costing the annual equivalent of US\$6,000 in value added, US\$16,500 in export earnings and US\$34,000 in fiscal revenues (Wiens, 1993).

If selling logs can bring in such earnings in comparison to processing them locally in the factories of Sabah and marketing them in the form of sawn timber and plywood, it means that processing them under these conditions does not lead to value added, but rather a loss of value. There are at least two factors involved here: first, there is the economic situation, where Asian operators are now actively seeking out raw wood on various world markets in order to supply the region's booming economies (in China, especially). Next, processing units are often far too large in comparison with the supply capacity of depleted local forest resources. The law of supply and demand being what it is, it is not surprising that log prices should remain firm, while those for plywood have not returned to satisfactory levels. From an economic viewpoint, then, it is more profitable to sell the logs than to process them into sawn wood or plywood.

But there are also some more fundamental reasons why the price of exported logs can sometimes make local processing less profitable. Processing units do not all have the same capacity to make use of raw wood. By using several types of processing, more than 90% of a log can be utilised; the residues from veneer lathing, for example, can be used to make MDF panels.

As to the manufacture of furniture or other wood-based products, this allows for much greater economic value to be derived from the wood, and contributes to a high value added. A good indication of these different capacities is found by comparing the price of logs on the international market to that for logs sold on the domestic market in countries that forbid their export. The average price per m³ for *meranti* logs on the domestic market in Indonesia (where the export of logs is virtually prohibited) was \$170-180 in 1996. The same type of wood exported from Sarawak (Malaysia) was selling during that same period at around \$220-225 per m³. Bearing in mind problems with the log supply in Indonesia (which should push prices upwards), this price gap is a good sign of the ground that Indonesia's wood processing industries have yet to cover to bring themselves up to international standards of efficiency. Production units that make better use of wood can afford to pay higher prices for raw wood than can less efficient units. In Sabah, the loss of earnings caused by the switch to processing logs that used to be exported (prior to 1993) reflects this relative lack of efficiency and the loss of value added inherent in the decision to process all the wood at home.

The price level is both an indicator, reflecting varying levels of performance, and an incentive factor for producers. Companies that import their logs are faced with competition from their rivals who must supply themselves with logs from these same international markets. They are ready to pay a high price to ensure a regular supply of raw wood. This pressure on raw material prices forces companies to make better use of the wood, if processing is to remain profitable. There is a clear interest, then, for the producing country to keep open the possibility of exporting raw wood: local companies must make real productive efforts to pay the price for logs in a market where exporters are

also active. This is helpful in terms of value added, and it encourages economy in the use of the raw material, since the price of wood is being set on an open market that can then play its role as an indicator of the scarcity of the resource.

Conversely, a ban on log exports generally leads to a drop in the price of raw wood on the domestic market (by driving out foreign demand). This step

Box 5.2 The false equivalence between physical recovery rate and value added

Although recovery rate can be a useful indicator of value added, particularly when “all other things are equal”, the two notions must not be confused, since one is a physical and the other an economic indicator.

- Physical recovery rate is the ratio between volume obtained from the primary product and the volume of wood entering the mill. The use of offcuts to manufacture mouldings and other secondary products represents a related utilisation that does not come into the recovery rate as such, but contributes towards creating value added. A declared recovery rate of 40% gives no indication as to the fate of the remaining 60%, which may be considered as “waste” or utilised.
- The quality of logs processed alters the average recovery rate. If the best logs go into the mill instead of being exported, the recovery rate will immediately increase. This does not mean that the technical or economic efficiency of processing has improved. There is a risk that potential value will be lost if high quality wood is processed far less efficiently than the international norm. This applies of course to any quality of wood, but only the better quality logs – of certain species – can be profitably sold on international markets and would earn more if exported as raw wood. There is no opportunity cost in processing for low and average quality logs so long as there is no more profitable alternative to processing them locally.
- An increase in recovery rate may be related simply to an increase in on-site abandonment. If an operator decides to leave the worst-shaped logs on the wood lot, or sell them on to pit sawyers, keeping only the best quality logs, he may declare flattering recovery rates, but his forest management will have suffered.
- Moving on to third-stage processing, such as manufacturing furniture or industrial carpentry products, may be accompanied by a fall in recovery rate in relation to sawn timber and, simultaneously, a substantial increase in value added, if the manufactured products are sold at a good price. This clearly shows that the issues of industrial processing must be tackled from an economic viewpoint, i.e. in terms of value, and not from a physical viewpoint, in terms of volume.

provides an effective degree of protection to local industries, which then have access to less expensive raw material than their foreign competitors who buy on the international market. This effective protection has helped, in Indonesia and Sabah, to promote growth that is more concerned with the quantities being processed than with the efficient utilisation of wood to produce finished products with high value added. The gap between over-capacity in the processing industry and the levels of harvest that governments themselves deem to be “sustainable” (a shortfall of 10 million m³ in Sabah and more than 20 million m³ in Indonesia) is the price that must be paid for these unwise policies, which are placing increasing pressure on natural forests.

There remains the question of employment, which might be thought to provide an argument in favour of maximum industrialisation. Yet, if the exclusive local processing of wood leads to a potential loss of revenue in comparison with a **mixed situation** (and a *likely* loss of revenue in the case of a ban on log exports), then the volume of employment created should, in theory, be lower than it would be under the optimal situation of free trade. In so far as the state has the fiscal means to capture a “normal” share of revenues from the industry, the higher the profit margins of the operators are, the greater that share will be. In principle, there is nothing to prevent the public authorities from converting these additional fiscal revenues into investments that will create jobs in other sectors of the economy (by undertaking infrastructure building programmes, for example). But we do not live in an ideal world. For one thing, African governments are in general poorly equipped to recover tax revenues and, for another, it is clear that these same governments have not always reinvested these revenues in productive activities. The case of oil royalties is a sad example in this respect.

Local processing of wood is without doubt necessary to take full advantage of the value of the timber resource. But there is surely room for a certain volume of log exports, side by side with an efficient local industry, and this can even produce the revenues needed to modernise that industry. Diversification also helps to smooth out the volatility inherent in the world market for these products.

5.2 Industrialisation from the viewpoint of interaction with forestry dynamics

5.2.1 The example of south-east Asia

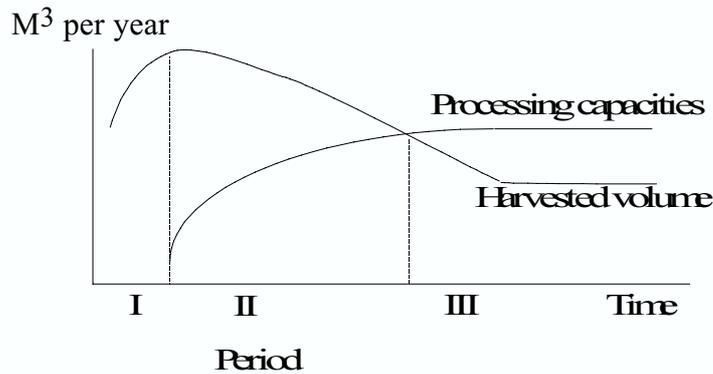
As a result of the economic strategies that were put in place as of 1975, Indonesia is now among the world leaders in the export of plywood. How did it get to that position? Essentially, by decreeing a ban on log exports during the 1980s. As a direct result of that measure, log prices have tended to decline on the domestic market, as it was closed to outside demand, especially from

Japanese operators; these were willing to pay higher prices for logs, because they could make more efficient use of the raw wood.

The plywood industry, now a priority target for the Indonesian government, began to take off thanks to three advantages: an abundant resource and a good market, an inexpensive workforce, and a management style in the industry where government and business worked closely together. Shortly afterwards, other Asian countries followed this example, and began to reserve the bulk of their timber harvest for domestic industries. This was particularly the case in Malaysia where the two states of Sabah and Peninsular Malaysia banned the sale of logs, while Sarawak, the world's largest exporter of logs, raised the share of raw wood reserved for local processing in annual increments. This expansion of industrial capacity in south-east Asia, however, came about at a time when its primary forests were being logged very intensively, with cuts per hectare often reaching 10-15 trees, equivalent to 60 to 80 m³ of marketable timber.

The rising strength of the timber industry was accompanied by the phenomenon of forest transition, whereby virgin forests were converted through logging into secondary forests. We may say that the exceptional volumes offered by the larger trees harvested in a virgin forest represent the real forest rent, in the original sense of that word as a "free gift of nature". But this rent disappears once the area has been logged-over, giving rise to a secondary forest that can be expected to supply (with some effort) a more modest but regular harvest.

Figure 5.1 The phenomenon of forest transition and the appearance of processing over-capacity



(adapted from Vincent and Binckley, 1992)

In an open economy endowed with vast virgin forests, large volumes are harvested, exceeding (by surface unit) the volume consistent with the "maximum sustainable yield" of subsequent harvests. In period I of the following graph, logs are exported, with little or no local processing. In period

II, two concomitant phenomena appear: the progressive transition of the virgin forest into a secondary forest leads to a slow decline in volumes cut, and the growth of processing industries is supported by public policies (such as a tax on exports of raw wood).

The curve representing the roundwood processing capacity tends to approach the declining curve representing volumes cut. In period III, processing capacity exceeds the “sustainable” harvesting capacity, i.e. the “maximum sustainable yield” from the forests that have already been cut once, and from forest plantations.

According to this theoretical scheme, in period III the supply of raw wood will stabilise, either through “sustainable” logging of the natural forest, or through the production of wood from industrial plantations at a rate high enough to make up for the “unsustainable” logging of the natural forest. In the course of period III, a country faced with the problem of over-capacity may be tempted to resolve it in various ways:

- by becoming itself an importer of raw wood, which presupposes that there is an international supply of wood available at a cost low enough not to make the local industry uncompetitive;
- by adjusting the industry’s processing capacity to the level of the domestic wood supply. The chances of increasing recovery rates by reducing the roundwood/processed product ratio are real, but limited. Restructuring of the industry would appear inevitable, either by closing or converting the least efficient processing units, or by moving some units to a country that has a supply surplus.

There may be a considerable temptation to attempt to *defer the decline in the supply of raw wood*, and the arrival of period III, by stepping up the pace of cutting and opening up new forest frontiers in areas as yet untouched, or that have been set aside as conservation reserves. In this case, harvest will be beyond the “maximum sustainable yield” expected from logging of the secondary forest, and the supply curve can only be kept horizontal in period III if industrial plantations are able to supply the amounts required on a lasting basis. Since the time needed to bring an industrial plantation into production is estimated at between 30 and 40 years – for trees of the same species as those cut from the natural forests – then any decision to develop such plantations on a major scale will have to be taken far in advance, at a time when the natural forest is still providing high harvest volumes, if an eventual persistent deficit in the domestic wood supply is to be avoided.

Under the impetus of the competitive advantages offered indirectly by restrictions on raw wood exports, the industries in south-east Asia have gradually found themselves left with excess capacity, a situation that has worsened as the forest transition phenomenon has progressed, with the more

accessible zones soon to be unable to support further logging. To give just one example, Indonesia is estimated to have the capacity to process 44.5 million m³ of raw wood into plywood, while its natural forests (apart from conversion forests) are capable of supplying only 22.5 million m³ on a sustainable basis (and that sustainability is yet to be proven). In Sabah, the 234 sawmills and 68 veneer plants existing in 1996 had the capacity to process 16 million m³ of raw wood, whereas the annual authorised cut at that time was only 6 million m³ (*Tropical Timbers*, 1996). From an economic viewpoint, this distortion poses serious problems of profitability, especially as many industrial jobs are at risk. These over-blown industries thus have a pressing need for wood that their natural forests can no longer provide in sufficient quantity. Logging of natural forests is thus continuing at full steam (Malaysia and Indonesia, the world's leading producers, still harvested about 33 million m³ each in 1996), and is moving eastward (into the Indonesian province of Irian Jaya) or into the mountainous zones where, when prices are favourable, helicopters are being increasingly used (especially in Sarawak) to gain access to places unreachable by ground-based machinery.

5.2.2 Ensuring reversibility of management methods by keeping options open

Alongside an efficient processing industry that makes economical use of timber resources, **adjustable volumes of log exports can serve as a balancing mechanism, providing the flexibility needed to adjust cutting levels to changes in the status of the resource** and in keeping with the uses that society wishes to make of its natural environment. This kind of adjustment cannot be brought about without some social costs, and without genuine political will, but it will make it more feasible to reverse choices inasmuch as the threat to industrial infrastructure and jobs is much reduced, these being especially critical considerations in most tropical timber producing countries. Shutting down a limited number of logging camps will not, from this viewpoint, have the same impact as closing industries that are highly labour-intensive, and whose workers will then join the ranks of the unemployed foresters.

The fact that some proportion of the natural forest harvest may be exported in the form of logs should be viewed in terms of **adaptable strategies and preserving a broader range of options for the future**, in contrast to the constraints imposed by insisting that all the wood harvested from natural forests must be processed locally.

How are we to reconcile the legitimate concern of African countries to utilise their forest resources for their own economic development with the need to keep open the broadest possible range of options regarding the ways the forest is to be used? Judicious use of the advantages of international specialisation can help to achieve this dual objective. We are not arguing here that African countries should focus exclusively on selling logs – there is plenty of room for an efficient wood processing industry in order to take maximum advantage of

the resource. Yet the export of some portion (a quota) of the natural forest harvest in the form of logs could offer a **margin of autonomy for the forest management system that would make the reversibility of logging options less critical** (Karsenty and Piketty, 1996)³⁸.

5.2.3 Promoting the development of a finished products industry

It is much easier to promote a primary or secondary processing industry³⁹ than one producing finished products, since the latter requires skilled manpower, suitable technical procedures and effective marketing strategies. Many tropical countries have had success in establishing a primary processing industry in substantial quantity, simply on the basis of having an exploitable forest resource, reasonable costs of access to that resource, and measures in place to restrict the export of raw wood. On the other hand, few have been able to develop a viable industry in finished products (where the true value added lies): only Thailand and the Philippines, and more recently Malaysia, have made any significant inroads in this area. Although they have become net importers of wood (Thailand is the number one **importer** in the world, and one of the major consumers of tropical sawn wood), the first two in fact have a profitable woodworking industry, thanks to the manufacture of furniture.

The recent crisis in Asia has shown the resilience of furniture industries in comparison with more standard products (such as logs, sawn timber or plywood) traded as “commodities” on the world market, which is extremely sensitive to the slightest price differential and the economic situation. Where exporters of plywood and sawn timber had to throw in the towel, furniture manufacturers were increasing their market shares with the help of local currency devaluation. Malaysia saw the value of its exports of wooden furniture and furniture components rise by 37% in Malaysian currency, to RM 1.97 billion (US\$ 518 million) during the first six months of 1998, while at the same time export receipts from forest products as a whole fell by more than one billion ringgits. This strengthens the conviction of Malaysian officials that efforts to diversify and specialise further downstream in the industry should be pursued.

Are there automatic linkages or spillover effects between primary and secondary processing (timber, veneer, plywood) and the production of tertiary processed or finished products? The answer would seem to be yes to some extent, judging from the fact that Asian furniture producing countries also have

³⁸ We are referring here to the “irreversibility effect” of the investment decision, when the implementation of a project drastically reduces the range of future options (the notion of “path dependency”). Irreversibility results from asymmetry between the cost of investment and of disinvestment, if the cost of the latter is higher than that of the former, and its counterpart may be the irretrievable loss of a country’s natural resources or cultural heritage (J. Bourdieu *et al.*, 1997).

³⁹ Plywood, for example, is a product of secondary processing, because it represents a more highly worked product (the gluing stage) than the (primary processing level) veneer sheet assembly from which it is made.

important industries at the primary and secondary processing level. But this probably also reflects a spillover effect from the vitality of the industrial fabric that is typical of this region (and which these industries have of course helped to weave). In the Philippines, the making of furniture, which is exported successfully all over the world, is based on a decentralised network of small enterprises, rather than on any large-scale industries (Guizol, 1992).

It might reasonably be supposed, pending specific studies on this question, that the manufacture and marketing of finished wood-based products does not require quite the same factors (such as the capacity to innovate, know-how, marketing, commercial networking) as mass production of sawn timber or plywood. This suggests the need for a clear differentiation in support policies for “industry” in general, and an effort to segment activities in terms of their real value added, as a first step towards identifying appropriate measures for giving them support or changing their direction.

Strategies for industrialising the wood sector

6.1 The need for limited protection

The major challenge can be stated thus: how can Central Africa make use of pricing and taxation policy to encourage efficient industrialisation – in a way compatible with viable resource management – that will generate high added value?

As we have seen, it would appear essential to maintain a degree of freedom to export logs in order to avoid severe distortion of the price system (where domestic prices are lower than export prices) that will prevent that system from reflecting the situation of the underlying resource (its relative scarcity). We may feel, however, that total freedom for log exports would not allow small-scale industrial units in Central Africa to develop to the extent needed to generate significant employment opportunities, given the handicaps they currently face (a weak industrial environment, little skilled manpower, an unstable economic and financial situation, etc.).

It is quite legitimate for governments to accord a minimal degree of protection for their processing industries in order to promote their growth, provided that they introduce instruments for guiding and monitoring the sector so as to limit the perverse effects that are bound to surface with any protection policy. It is acceptable to protect industries from the outside environment **if governments stimulate and organise competition between domestic industries** to boost technical innovation and economic efficiency in forest sector companies.

Resorting to quota systems (quotas for raw wood exports, quotas for processed logs) may be a suitable instrument for promoting the efficient processing of wood in Central African countries, by combining relative protection of processing industries with the ability to organise genuine competition between operators through the sale of such quotas and making them transferable.



Setting the levels of the quotas in recognition of the resource situation and the performance of the industry will allow for some flexibility in national strategies. The quotas can in fact be negotiated between the government and the operators.

There are, however, two variables that must be clearly recognised and carefully ranked:

- *the level of pressure on the resource*, which is controlled through the annual cutting allowances in the natural forest. This variable cannot be approached from a purely economic viewpoint, since it depends on an assessment on the forest's capacity for renewal and involves a trade-off between the goals of development and those of conservation;
- *the distribution between export and local processing, in the context of fixed limits to the offtake from the natural forest*, which involves a trade-off between maximising total commercial returns from forestry and the level of effective protection granted to domestic processing industries.

What interests us in particular is this second variable, viewed as a percentage distribution.

Example: *a country decides to allow a total cut of 2 million m³ in the natural forest for a given year. It then decides to set the log export quota at 55%, reserving a minimum of 45% of the cut to local processors. These companies may process more than their 45% allocation by buying up log export quotas and diverting them to domestic processing (which will only be possible if domestic processing really represents value added at world prices: i.e. the opportunity cost of processing < 0).*

Maintaining effective protection by restricting the proportion of log exports should not be regarded as a long-term management solution. A restrictive measure like this should be used only as a temporary tool, to encourage companies to specialise in value-added products that will allow them to pay for their raw material at prices comparable to what their international competitors are paying. By making it clear to operators that the log trade will be liberalised over time (with a growing percentage of raw wood allowed for export within a total offtake that may need to be reduced), they will be induced to specialise in areas where they can compete without the benefit of protection, and this will lead them to make the investments needed to prepare for the day that situation arrives.⁴⁰ The pace of this gradual liberalisation can be a subject for negotiation between government and industry, with targets formalised by contract.

⁴⁰ For political reasons (there is a widely held view that exports of raw wood are a bad thing), the prospect of a total lifting of such restrictions is probably remote in several countries. Other ways must be found, then, to ensure that in the end the cost to processors of buying the raw material will rise, and so to induce them to modify their manufacturing methods to use less wood. Thus, tax measures might be considered to encourage processors to specialise in value-added output, by decreasing the tax rate as value added by processing units increases. A proposal to this effect is put forward in section 7.2. Yet the distributive effects of a tax-based solution are not the same as those that flow from trade liberalisation: a tax implies a transfer of money to the government, while commercial freedom allows operators to keep a portion of the rent (the part that is not captured by export taxes). What use operators will make of this rent (whether they will invest it in the industry or not) is of course not certain.

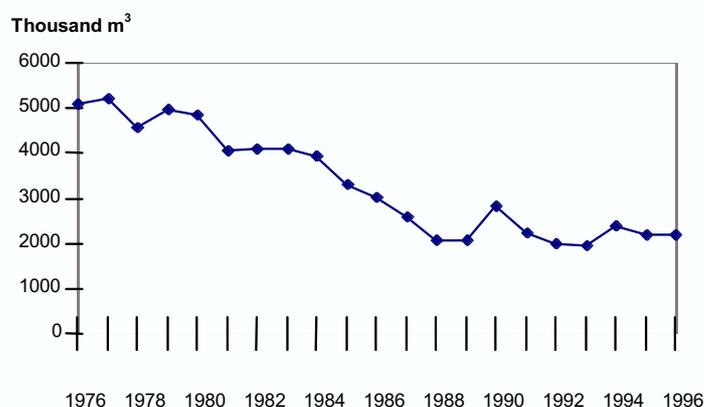
It should be noted that current policies in the sub-region run in the opposite direction, since they are aimed at placing growing restrictions on the raw wood trade's share. It is true that in Côte d'Ivoire, where there is a virtual ban on log exports, some industries are beginning to specialise in value-added products (wood flooring, etc.) and are upgrading their facilities to make better use of the resource. But it must be remembered that this (delayed) reaction on the part of local companies is a direct result of the continued depletion of the country's forest resources, which has been underway for more than twenty years, and which has effectively foreclosed the alternatives that were once open to these operators, and are still open to their counterparts in Central Africa,⁴¹ namely a less advanced form of processing whose competitiveness rested on the quality of the wood used, its abundance and its low cost.

The problem facing a forestry policy that seeks to ensure sustainable management and maintain maximum flexibility as to future options is, in

Box 6.1 Continued depletion of forest resources in Côte d'Ivoire

In Côte d'Ivoire, a concession of 2500 hectares used to produce on average 20,000 m³ of red wood in the 1960s. In the 1970s, this figure had dropped to 10,000 m³ of mixed red wood and white wood, while in the 1980s the yield was 3,000 to 5,000 m³, most of it white wood, except for the area near the savannah (*Iroko*). Today, the main species logged is the *fromager* (*Ceiba pentandra*) is a good indication of the extent to which the forest resource has been degraded.

Production of industrial logs in Ivory Coast



The production of logs began to rise steadily in the early 1960s, stabilising at around 5 million m³ in the second half of the 1970s, then dropped rapidly after 1985. Despite a slight recovery in 1994-1995, as a direct result of the devaluation of the CFA franc, output again started to decline, and stood at barely 2 million m³ in 1996. The fall is likely to be even more marked in coming years, with the expected exhaustion of the government-owned "*domaine rural*" resources that today supply more than 90% of wood production.

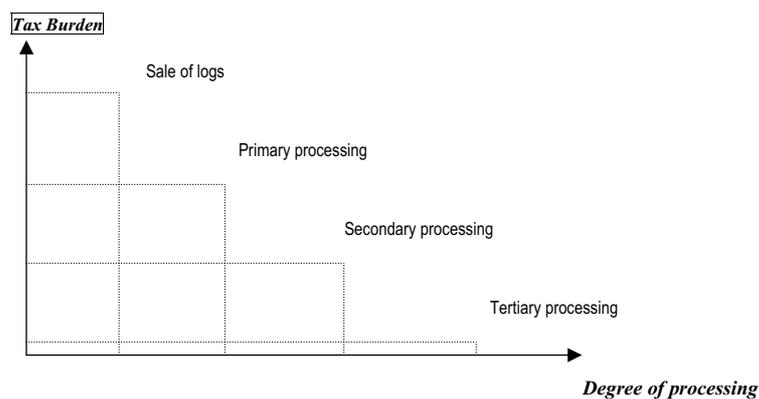
⁴¹ There are many European operators, moreover, who started out in business in Côte d'Ivoire, but who have left the country and moved their operations to Central Africa.

effect, how to influence operators' strategies *before* the resource is exhausted and they have no other choice (apart from abandoning forestry activities, having amassed their capital and made their fortunes).

6.2 Proposals for indexed tax reductions on value added

Among the incentive measures that might lead to more efficient processing, one worth considering is to introduce a differentiated tax regime. Several ideas in this regard are currently under debate in Central Africa, with a view to reducing the tax burden in proportion to the increase in local processing (see following diagram).

Figure 6.1 Decreasing rate geared to degree of processing



This proposal assumes implicitly that the degree of processing and the degree of value added are perfectly correlated. We have seen, however, that this assumption is often a shaky one, for at least a segment of the raw timber (the higher quality logs) used in primary and secondary processing, because there is an opportunity cost to this processing. That opportunity cost is only apparent to the operator insofar as the export of logs is not prohibited, since this will allow him to compare his earnings from exporting a m³ of processed product against the earnings foregone by not exporting the same quantity of raw wood that he has used in his processing. From the national viewpoint, this opportunity cost relates to the loss of export revenues attendant upon a log export ban. If the first or second stage of processing higher quality logs (those in demand on the international market) does not produce value added (as revealed by the opportunity cost of processing), then it would be inadvisable to introduce a tax system that encourages this kind of specialisation.

The principle of decreasing taxation can be valid, provided that the relief is linked to the value added from processing, and not to the degree of processing

itself. Yet it may be difficult to gauge this value added if the country has imposed a ban on exports of raw wood, which will distort prices (opening a gap between the domestic price of one m³ of wood of a given species and quality and the FOB price of one m³ of equivalent wood on the regional market). To estimate the value added by processing one m³ of wood, we can use the following formula:

Price of one m³ of processed product – (equivalent FOB price of one m³ log / wood recovery rate).

Example: *one m³ of veneer sheet of obeche [Triplochiton scleroxylon] sells for export at FF 2,400. The FOB price of one m³ of obeche log is, on average, FF 1,100. The recovery rate is 40%. The value added is: 2,400 – (1,100/0.4) = –FF 350. This negative value represents, in this case, the opportunity cost of processing. An increase of 6 points in the recovery rate would be needed, at these price levels, to produce any value added.*⁴²

It is clear that we must be able to compare similar products, within the existing commercial classifications: LM, B, BC,⁴³ etc., i.e. wood that has a potential opportunity cost.

To overcome temporary effects (e.g. price bubbles for one species induced by advertising), the equivalent FOB price can be taken as an average of prices for the preceding year. There are other technical difficulties, such as the following:

- absence of an equivalent FOB price. This may happen when a species is peculiar to one country (e.g. *okoumé* in Gabon), or when other countries that could export that species have imposed a ban on exports. In this case, we may establish a notional price by taking as a basis related species that have similar characteristics and uses;
- utilisation of by-products and processing wastes. The price of the by-product from the production of one m³ is added to the price of the main product;
- the combination of several species or several materials in a finished or semi-finished product, e.g. the use of eucalyptus veneer for the inner layers of a plywood board, where the outer layers are of *okoumé*. The quantities of

⁴² Transport costs are not included, since the transport situation may vary (a factory may be located near a port or in a forested area, transport may be contracted out or handled directly by the company). Note that the viewpoint taken here is that of the national economy: log exports imply relatively higher transport costs, and hence higher intermediate consumption costs for the forestry company (which reduces the value added in the “agriculture, forestry and fishing” branch, to use the terminology of the French national accounts). But on the other hand, this transported volume will generate added value in the “transport” branch, which will show up in the country’s GDP.

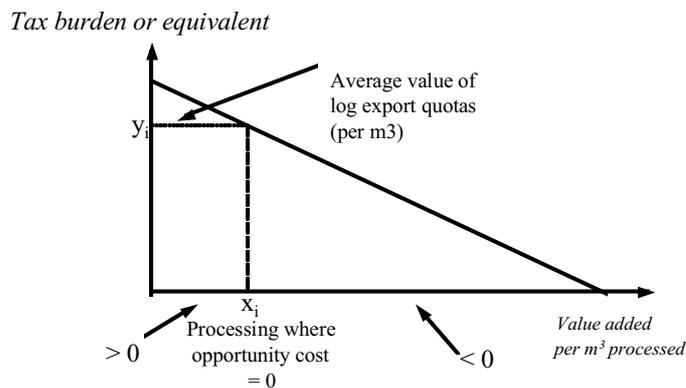
⁴³ In Cameroon, LM is “Loyal et Marchand” (an old-fashioned term to designate the best quality). B, is the “second-best” quality (the A class does not exist since there is LM); C is the third quality. In Gabon another classification is used: LM, QS, Cl...

eucalyptus are valued at their purchase price (or the production price). The formula becomes:

Price of one m³ of product – (equivalent FOB price + local price of raw wood needed to produce one m³ of the processed product + price of consumables).

A decreasing taxation system of this kind is fairly simple, can be combined with a system of quotas on log exports (distributed by auction), and can provide an incentive to specialisation in value-added products, either by raising recovery rates and utilisation rates in the primary and secondary processing stages, or by encouraging the manufacture of finished and/or tertiary processed products.

Figure 6.2 Decreasing taxation geared to value added



In the diagram above, the tax burden on a m³ of processed product declines as the value added by processing rises. The average price required to acquire one m³ of log export rights for a particular species serves as a basis for determining the tax y_i , which represents processing at zero opportunity cost x_i (i.e. processing does not produce any positive added value, but does not imply a loss of value).

From a taxation point of view, it does not matter whether the log is processed or exported. If processing produces an opportunity cost greater than 0 (loss of value), the tax payable is greater than the cost of the export rights y_i (average cost of acquiring 2 m³ of exportable logs for a recovery rate of 50% consistent with an observed national average), as determined at auction. It then becomes costly in fiscal terms to process wood under these technical conditions. Finally, if processing produces positive value added, the tax burden drops proportionately, and represents from the outset a lower cost than the purchase of log export rights. A description of how the system works in practice can be found in Annex 2.

Assistance for the industry, in addition to tax breaks

7.1 Support for staff training

The competitiveness of the wood processing industry could be helped by a more appropriate taxation policy, one that would also be compatible with the requirements of renewing the resource. But there are limits to assistance of this kind. Industries are in urgent need of support in an area that, according to their own statements, is often viewed as one of the key limiting factors: staff training. It takes skilled workers to produce high value-added goods, and processors are not in general inclined to make heavy investments in this area, because they have no guarantee of a future return.

The sums needed to implement sound vocational training systems are considerable. This could be one point of focus for international finance, but it is above all an ideal candidate for claims on forestry royalties and taxes.

There are at least two obstacles to the provision of vocational training. The wood industry does not have strong enough inter-professional structures for it to accept full responsibility for running a training system. Government participation will be essential, in close partnership with the industry. Yet in Africa, training systems are nearly all in crisis, and there is not much reason to think that this particular one will be an exception. What is needed is to break with the (for the fiscally orthodox) sacrosanct rule of consolidated revenues and single budgets [*unicité budgétaire*], and accept that some of the tax revenues collected in the wood sector may be earmarked in advance for use to finance a training system devoted to the sector itself.

The defenders of consolidated budgeting have ample arguments for refusing to earmark tax revenues (the risk of setting up sectoral fiefdoms, equity considerations among economic and geographic sectors with uneven resource



endowments, priority to reducing the national debt, etc.), but investment in training of this kind could in fact promote swift development in the sector, and could increase tax receipts by raising the degree of value added.

One possible formula is to set up a **forestry fund** through which all tax revenues from the sector would have to pass, even if a portion of these were then redirected to other purposes. Such a fund would make it possible to keep an accurate record of revenues from forestry activities, and would facilitate the earmarking of certain taxes or royalties in favour of the forestry sector itself. It would still be possible to use a portion of these funds for other sectors (or to pay part of the external debt service with them), at the express decision of parliament.

7.2 The importance of developing a domestic market for logs

In several Central African countries, the law requires each operator to engage in both logging and processing. In the case of Cameroon, every operator must, theoretically, process at least 70% of the logs that he cuts. The national policy on domestic processing is extended to concession level as well. While it is only partially enforced, this provision has encouraged the multiplication of what G. Buttoud (1991) calls “alibi factories”, that process wood with very low recovery rates and are set up solely to justify the application for a logging concession, while the bulk of profits is expected to flow from the export of unprocessed logs.



Moreover, given the narrowness and specific focus of certain export markets, it is common for operators to specialise in certain species, and these may vary from one operator to the next. This fact, which is familiar to foresters, produces diversity in cuts from one concession to the next, and encourages “going back over” when, for example, an operator who is specialised in white woods moves into the logging preserve of an operator who was cutting essentially red woods, and has left most of the white wood standing. These repeat cutting cycles, following close upon each other, which are very common in Central Africa, have had a severe impact on fauna and vegetation, and have seriously disrupted natural regeneration after logging.⁴⁴ The requirement for the operator to process most of his cut himself places a tight limit on the prospects for developing a domestic market for logs, and hence encourages more selective cutting on each concession.

⁴⁴ This practice has affected in particular the forests of Côte d'Ivoire, which have been degraded by such quickly repeated logging cycles. It also casts doubt on the data showing low average logging volumes per hectare in Africa, including Central Africa. If each round of logging takes out 10 to 12 m³ at a time, but the same area is logged four times in ten years, we arrive at a total take of 50 m³, which has obviously more severe consequences for regeneration than would be suggested by the size of the first cut alone.

A broad domestic market for logs is needed if a cluster of processing industries is to grow up in accordance with the logic of comparative advantage. The specialisation of units (on an industrial or sub-industrial scale) in certain products and certain species helps to increase the utilisation rate of the raw material and, upstream, discourages hyperselective logging. This in turn will reduce temptation to resume exploitation in a recently-logged forest. Not all operators will be able at the same time to conduct logging operations under a sound management plan, and to build an efficient industrial structure for processing a wide variety of species into high value-added products. Legislation should therefore distinguish between national *objectives* in terms of the proportion of logs to be processed **within the country**, and the *obligations* of **individual operators** to perform their own processing: **the latter should be eliminated** in order to promote more efficient industrialisation. The role of the state would then be to encourage the development of regional and national markets, in co-operation with the forest industry, which should manage the system.

The outlook for a generalised system of incentives

8.1 The influence of discount rates on private operators' investment decisions

The misalignment between the time horizons of private investors and those needed for the regeneration of natural forests creates a permanent tension between the logic followed by forest operators and the constraints of sustainable forest management seeking to preserve some stability in the ecosystem. Financial calculations will hardly ever favour a project where the prospect for a return on investment must extend beyond the tenth year. In ecosystems as diversified (and often changing) as the humid tropical forest, there are many foresters and ecologists who believe that the sustainability of a management approach that includes logging cannot be really established until after the second, or even the third cycle (Goodland *et al.*, 1991), especially when we take into account how regeneration is affected by the interaction between logging by man and the natural dynamics that cause species to succeed each other over time. Under this hypothesis, sustainability must be measured over periods of time from fifty to a hundred years, depending on the ecological and economic setting, i.e. over a time scale that is totally different from that used in financial calculations, which use positive discount rates that downplay the weight of future benefits in comparison with those expected over the short term.

Discounting raises a theoretical question that is key for any forestry management approach that is to be viable over the long term. The abstract notion of the discount rate expresses the (supposed) preference of individuals for the present: the higher the discount rate is, the more sharply the future will be depreciated.



From a practical point of view, we might consider that this discounting procedure is the opposite of the compound interest rate mechanism, and that in fact the discount rate that a company selects to compare projects will be based on long term interest rates (the investment opportunity principle), increased generally by a risk premium. The perception of risk, for the private investor, is in effect an important component in determining the discount rate. The higher the degree of uncertainty about the conditions that will prevail in the future, the more the investor will tend to favour investments that offer short-term rather than long-term returns.

This is a well-known problem in forest economics. It has served in a number of European countries to legitimise the state's monopoly over forestry, on the grounds that only the state can afford to undertake investments where the payback will not become apparent for several decades. When S. Latouche (1994) pointed, with a note of irony, to three hundred year old oak trees planted once upon a time by kings who were as enlightened as they were disdainful of financial calculations, and called them examples of sustainable development, he was giving voice to this point of view. In the 19th century, it was thought that a discounted revenue calculation would prove that any property owner had an interest in clearing his land or selecting species with a short life cycle, such as raising coppice rather than high forest trees (Poupardin and Larrère, 1990). If, fortunately, that was not the case, it is because this reasoning neglected to take account of the diversity of forest owners' objectives, which cannot be reduced simply to the image of *homo economicus*, rational and utility-maximising, and endowed with an undeniable preference for the present with no heed to posterity.

Nonetheless, the problem remains a real one, and in particular for the tropical forest. By extrapolation, indeed, any even slightly costly present effort, undertaken with the aim of preserving the forest capital for the long term, is contrary to the private agent's rational interest, since any benefits he may draw several decades hence count for nothing next to the expenses he will incur today. That leaves the state⁴⁵... but we all know how things stand at this time in Africa. Taking this as the starting point, experts have proposed simplified management methods that abandon any idea of real forest husbandry:⁴⁶ since the discounted value of gains from silviculture is virtually nil, as those gains will only be realised in 30 or 40 years (the discounting mechanism), they conclude that operators, acting on rational economic grounds, will devote no effort to such actions, and if these are thought desirable, they will have to be put in practice by the state.

If realism means not asking an operator to look any further than the immediate cost-benefit ratio, it is hard to see much hope for forest management

⁴⁵ The state is entitled to make investments using a very low discount rate, so as not to prejudice the interests of future generations by systematically favouring short-term choices – government has in theory the same (or nearly the same) regard for those future citizens' interests as it has for those of present-day generations (on the choice of discount rate, see Benhaïm, 1993).

⁴⁶ See, for example, the report on forest management prepared by the ESE consulting firm (1994).

prescriptions that would encourage regeneration of the forest. Why then should we ask the operator to take expensive measures to optimise his road network, clear creeper, practise directional felling, provide drainage for skidding tracks, and practise silviculture (including enrichment plantations),⁴⁷ etc., if the discounted benefits over 30-40 years of such efforts tend towards zero? There is an apparent contradiction here that underlines a problem very familiar in forest economics: the tension between present profits and future benefits.

Historically, this problem has been addressed in at least three ways: the first was that of ritual management by forest dwellers (hunters and gatherers) in which symbolic notions and beliefs served as the instruments for regulating the man-forest relationship. The second is that of management under the guidance of the state, which sets the long-term objectives. Since Colbert, the French have been very familiar with this model. A third solution is that of “patrimonialisation”, or property rights, which reconciles the private (individual or collective) logic of accumulation with the concern to pass on capital to posterity. This is the model used in some private forests in Europe, such as in the Landes de Gascogne, and in a number of forests that belong to village communities.

The problem arises from the fact that, in terms of the dense humid forests in the regions of interest to us here, we are faced with the logging of so-called “primary” or virgin forests by large companies whose capital is mobile (they can abandon the forestry business), in countries that suffer from chronic institutional shortcomings (a weak state and uncertain policy continuity), and in which property rights are by no means assured (who owns the forest?). All of this leads operators to adopt behaviour consistent with very high discount rates. Yet it is precisely for this reason that we need to devise new ways of regulation that can deal with the specific and difficult nature of the problems posed by logging of the humid tropical forest.

8.2 Rewarding conservationist practices

The challenge in redesigning the “rules of the game” for forestry is to find a way to overcome the natural tendency of operators to “sacrifice the future for the present”, by putting them in an economic and institutional situation that gives them an incentive to manage the natural resource while they exploit it, and to select options that will enhance the benefits from future logging, paying strict heed to the definition of sustainable development (“meeting the needs of today without compromising those of future generations”). Eco-certification represents one attempt to modify the decision-making process of operators in their approach to forest management.

⁴⁷ Knowing that all of these actions will have a direct impact on regeneration of the forest and on the volume of wood from the second cut.

8.2.1 Certification, a first step towards introducing an incentive dimension into forest management by private operators

In proposing that market access preference be accorded to products from forests that are responsibly managed, according to the recognised principles of sustainable management, the proponents of wood certification are suggesting that investments in sound management procedures, and the possibly attendant decline in harvested volumes, could be compensated by the prospect of increased (or assured) market share, where consumers, apart from their personal buying decisions, are able to influence the purchasing policies of their country or local authorities. Whether such systems are based on certification of procedures (the philosophy of the ISO standards) or on field inspections (the ambition of the FSC – Forest Stewardship Council principles and criteria), the idea is the same. The incentive dimension is strengthened by the *a priori* voluntary nature of the initiative being proposed to operators.

8.2.2 The imaginative universe of consumerism

The reason why the idea of certification has such resonance is probably that it draws on the altogether contemporary notions of individualism and consumerism. M.C. Smouts (1998) strikingly reveals this imaginative world which is so familiar that it goes almost unnoticed. She points out that certification, focusing on the market and individual responsibility, echoes three of the major features of our time: marketisation, individuation and bureaucratisation.



According to M.C. Smouts, marketisation ideally implies that sustainable environmental management should be financially profitable, enabling “virtuous” companies to gain market share by taking part in conserving nature. This assumes “responsible” attitudes towards consumption and this is where the second ideal comes in, i.e. individualisation of the relationship to the forest. Certification actually provides individuals with the impression (illusion?) that safeguarding the tropical forest depends on their consumption choices and that they can thereby influence the decision-making processes of major companies, gaining great satisfaction in ethical terms – very cheaply. Finally, the “private” logic of certification has the effect of marginalising governments in the South, supposedly unable to take responsibility for the common good, and underpins the work of the new bureaucracies of international conservation that the major institutionalised NGOs like WWF (Worldwide Fund for Nature, the leading proponent of FSC principles and criteria) have become and on whom this process confers legitimacy without the need to be accountable to anyone except their private donors, convinced that what is good for the tropical forest is good for the planet.

8.2.3 The limits to certification systems for tropical forests

Commercial trends are unfavourable to generalised certification

There is some doubt about the effective degree of penetration that certification could hope to achieve in the wood market, at a time when the geography of the timber trade is undergoing some pronounced changes. Studies show that only 20% of European customers and 10% of North American ones would be sensitive to a certification initiative. Moreover, consumers do not seem to be prepared to pay substantially more for certified than for non-certified wood (Varangis, Crossley *et al.*, 1995).

Attempts could of course be made to increase consumers' awareness and "readiness to pay" by introducing a reliable, internationally regulated certification system. It remains the case, however, that the growing markets in Asia, with China in the lead, in Latin America, and perhaps tomorrow in Africa (starting with South Africa) are (still?) rather indifferent to the conditions under which the wood they buy was produced. It is noteworthy that more than 50% of the logs exported from Cameroon and Gabon in 1996/7 went to Asia, albeit before the crisis hit. We must await a lasting improvement in the Asian economic situation to see whether this considerable shift in trade flows – that once involved Africa and Europe almost exclusively – really is a structural phenomenon. In 1998, the year when the impact of the crisis on the market for wood was felt most, Cameroon was still exporting one third of its logs to Asia, mainly to China which has little interest in certification.

Certified forests in the North, endangered forests in the South

There was something odd about the map of certification in 1998: the bulk of the major forests that had obtained FSC-type certification were in the developed countries of the North. Of the 125 forests with FSC certification (a total of some 10.4 million hectares), only 28 were in the tropics, covering 2.2 million hectares, and half of this area was made up of a natural forest in Zambia, i.e. outside the major logging areas in Central and West Africa where no certification had been possible (*Tropical Timbers*, July 1998). Only one forest was certified in south-east Asia and three in the entire Amazonian basin.

In addition, most of the certified forests were plantations and only rarely natural formations. Certification is understandably a good deal easier when there is a low level of competition for land, ecosystems are simplified and artificially shaped, information systems are efficient and techniques wholly mastered, with no dispute as to their effect (which is not the case for silviculture in tropical forests). In short, certification lends itself better to the circumstances of developed rather than developing countries: Sweden and Poland, each possessing 6 million hectares of certified forests on their territory, bear witness to that. In reality and although this is in no way what its

advocates want, certification increasingly resembles those non-tariff barriers that are anathema to international trade organisations – and it is helping to erode the market share of tropical wood in Western countries. This brings us back to the paradox of the boycott, whose perverse effects have been criticised by the advocates of certification themselves: the falling value of tropical wood is bound to encourage loggers to take a very short-term view and governments to promote the conversion of forests to different, more profitable uses.

A fragile system that relies on trust

The key test of the certification initiative will come at the time of the business transaction, when the market will have to sanction the strategies of private operators seeking to market their certified products. This exclusive focus on the market is precisely the weak point in the certification concept. Trade has many virtues, but more and more citizens feel that it is not up to the market alone to deal with questions that involve the future of our planet, and that refer to long-term societal choices. By paying more to buy a certified product, in order to help safeguard the world's forests, individuals are moving beyond standard consumer logic, and committing themselves to a citizenship approach they must protect from commercial interference and the strict logic of the market, which is held responsible – rightly or wrongly – for the overexploitation of our forests.⁴⁸ The initiative to buy a certified product thus relies from the outset on a paradox: a market mechanism is being asked to counter the effects of strict market logic.⁴⁹ This paradox might be overcome by the *trust* that citizens-consumers have in the system, in its procedures for inspection and regulation. Yet that trust, a key notion in the trading process,⁵⁰ is a fragile sentiment, and its loss threatens at any time to revive the initial paradox – and there is no shortage of factors that might conspire to destroy such trust.



We cannot overestimate the difficulty of reaching agreement on the criteria and indicators for sustainable management of tropical forests. The notion of sustainable management is susceptible to many interpretations, depending on the particular sensitivities of those formulating them. One of the difficulties in seeking criteria and indicators of sustainable management is that we must at the same time give content to an uncertain notion (selecting criteria for sustainability, which assumes that we can define it), and identify signs of its

⁴⁸ An analysis could be made here in terms of “cities” or “communities”, as proposed by Boltanski and Thévenot (1991), each of which, whether “civic”, “industrial”, “domestic” or whatever, has its own value system. Crisis and conflict occur when an attempt is made to transpose a system that is legitimate in one “city” or “community” to another.

⁴⁹ The same kind of paradox shows up in proposals to buy up shares in forestry companies traded on stock exchanges, in order to exert influence over their practices. Such a strategy is not in itself unrealistic, but it does assume that citizens will agree to play the stock market game, with all its implications (including the risk of losing their money). Two different but legitimate visions are in conflict here: that of citizens who believe that preserving the quality of the environment is a fundamental right that should not be subject to financial interests and stock market value considerations, and that of companies that consider the collective preferences of their shareholders to be a reasonable proxy for the general interest (recalling that liberal economists reject the idea of “public interest” on the grounds that society is nothing more than the aggregate of private interests).

⁵⁰ Several recent works of economic theory have discussed the importance of this notion of confidence or trust as the foundation of social ties. See in particular A. Orléan (1994)

manifestation (building indicators of sustainability, which assumes that we know how to define it, and that we can measure it – Zumbiehl, 1996). Moreover, apart from the differences of conception among experts as to the practical definition of sustainability, there are many scientific uncertainties about forest dynamics over the medium and long term that make it a delicate matter to assess the impact of any method of logging on the status of the forest over a time frame of two cutting cycles (let alone three).

These uncertainties, frequently raised in scientific debates about the environment, pose a threat to the credibility of any certification system. It can only work if it enjoys the trust and confidence of consumers who are sensitive to global environmental problems, to the point of making a personal commitment to it (being willing to pay a premium for certified products, for example). Confidence and uncertainty rarely make good bedfellows, unfortunately: although it may be feasible to strike a consensus among scientists and experts on the criteria for sustainable forest management, while taking due account of uncertainties and allowing for inevitable differences in interpretation, the selective public presentation of more alarming elements (about the fate of certain animal species disturbed by logging, for example) may at any moment undermine consumer confidence in the certification process, regardless of what the experts say. The abortive attempt to certify concessions belonging to the Leroy-Gabon company in 1996-1997 is a good illustration of this precarious balance. After SGS-Forestry had granted FSC-type certification for two concessions it had visited, a virulent media campaign (conducted mainly in the United Kingdom and instigated by radical ecology groups) led the protagonists to give ground and withdraw the certification procedure. Since then, there has been no certification in Central Africa.

8.2.4 Performance bonds

It should be possible to overcome the weaknesses of certification systems by shifting the emphasis so that practices are sanctioned not at the time of sale but at the time of production, while maintaining the incentive nature that is one of the strong points of the concept. The idea of “performance bonds” was put forward a few years ago in papers from the World Bank (Blakeney, 1993), in direct connection with an analysis of the divergence between the private interest of operators and the national and global interest in preserving environmental resources that are of no direct interest to the private operator (such as carbon sinks or biological diversity). One of the problems was the lack of solid thinking about sustainable development standards that would allow the performance of operators to be assessed.

With the initiatives now under way on certification, the international debate has been making progress, at least as regards the definition of “criteria and indicators” for evaluating operating practices and forest management.⁵¹ This

⁵¹ Thanks in particular to the international CIFOR project, under which the different sets of criteria and indicators proposed by various institutions or ad hoc bodies would be tested out on operating forestry units.

research, based on a concern to reach an expert consensus, is aimed at drawing up a minimum set of criteria and indicators that would represent, in fact, the lowest common denominator among the parties involved (researchers, managers, international consultants, etc.), who have varying sensitivities and professional interests. It would be too much to expect this process to provide the key to sustainable management of tropical forests, even assuming that it is possible to adopt one set of assessment criteria for ecosystems as diverse as those of the humid tropical forest zones. Nonetheless, it is hardly imaginable that an international system of regulation, flowing from political decisions, could function without a minimum set of standards, provided that these standards are adaptable over time (incorporating new research data) and geography (taking account of the variety of settings and the different needs and views of local stakeholders).

If we accept that international agreements can be reached to lay the basis for a minimum set of criteria and indicators for “sound forest management”, and for assessing operators’ practices in the field (this is the ambition of the Forest Stewardship Council), then we might envision an incentive mechanism that draws on the ideas of “performance bonds”, one that would not be affected by the limits and weaknesses of the certification system. A financial mechanism has been suggested that would offer efficient operators the chance to receive interest on a certain amount of invested capital, as a function of the kind of management they practise in their operations. Since the mechanisms of compound interest and discounting are perfectly symmetrical, operators’ financial expectations over several decades hence will change if the interest rate offered for a given term is enough to offset the depreciation of profits over time (those profits being linked to better forest regeneration and silviculture operations that increase the merchantable volume of each cutting cycle).

The general operating principle of a performance-indexed plan

- A performance-indexed financial mechanism is based on having the operator deposit an initial payment proportional to the area he intends to exploit, for a given period of time.⁵²
- This deposit is placed with a specialised financial institution (a special fund) which offers highly favourable interest rates, thanks to specific funding from the international community.
- A fraction of the deposit is returned, at regular maturity intervals (with the corresponding interest due), this fraction being paid back after an examination of the operating conditions in the zone concerned (inspection can be ex –post or conducted from time to time during logging). Poor performers will suffer penalties, deducted first from interest and then from the capital, the amount of which serves to calculate the interest. Good

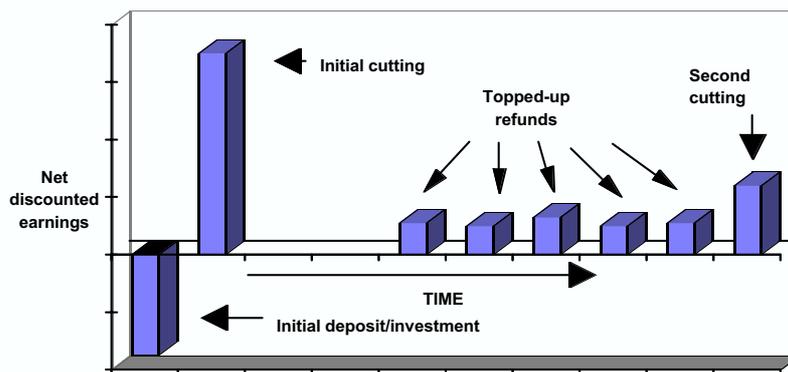
⁵² J. Blakeney (1993) considered that \$5 to \$10 per m³ of potentially exploitable wood in a given zone would be appropriate values for Indonesia.

performers will be rewarded with a full share in the incentive system. Alternatively, a concessionaire who stuck with it to the end of his “plan” could recover his initial investment (less any withholdings) and the accrued interest, and have the chance to benefit from preferential interest rates for new investments in the forest sector.

A system for rating the environmental performance of forestry companies could be introduced to calculate the interest rate paid to the operator, along the lines of the performance “scores” that specialised agencies award to financial institutions (or governments).⁵³ This arrangement offers several advantages in comparison with certification:

- it can be extended to all forestry concessions and, because it cuts in at production level, the final destination of the wood is irrelevant, whether it be for the local market, Northern European markets which are more sensitive to green issues, or the Asian market which is markedly less so;
- it avoids the “certification” or “non-certification” alternative which raises the problem of determining a performance threshold beyond which an economic operator can claim (certified) “sound management” and below which the more long-term efforts he has made to improve his methods may not be rewarded. If a theoretical performance scale from 0 to 10 is suggested, with the maximum referring to the best possible practice bearing in mind the status of available techniques and specific constraints facing the country and the forest, it should be possible to place operators’ efforts on a continuous

Figure 8.1 Influence of a performance bond system on an operator’s potential earnings



(Adapted from Blakeney, J. *Performance Deposit – An Incentive for Sustained Forest Management*, D’Silva & Appanah, 1993).

⁵³ This would take into account the two evaluation systems that usually feature as opposites in the certification debate, i.e. the principle of ISO standards (certification of a company’s procedures and its environmental management capabilities), and criteria of the FSC type (assessing the company’s effective performance on environmental issues).

scale, without having to set a threshold that would generate all kinds of tension. In this way, discussions between evaluators and operators might be more open since the financial consequences of a slightly lower score would be markedly less serious than failure to issue the famous certificate;⁵⁴

- a performance-indexed plan should encourage operators to seek continuous improvement, whereas the certification system shares the well-known defect of certain environmental standards which tend to line up all operators (or at least those who want such certification) on a minimum performance level, with no special incentive to go beyond that minimum threshold.

Introducing such a mechanism raises a number of problems. Some are similar to those generally mentioned in connection with certification: when it comes to performance evaluation procedures, who will do the evaluating and what will be evaluated? We shall not dwell on these here.⁵⁵ Others relate to the financing of such a system, in particular the financial subsidies involved in the high interest rates offered to efficient operators, and the permanent evaluation scheme.

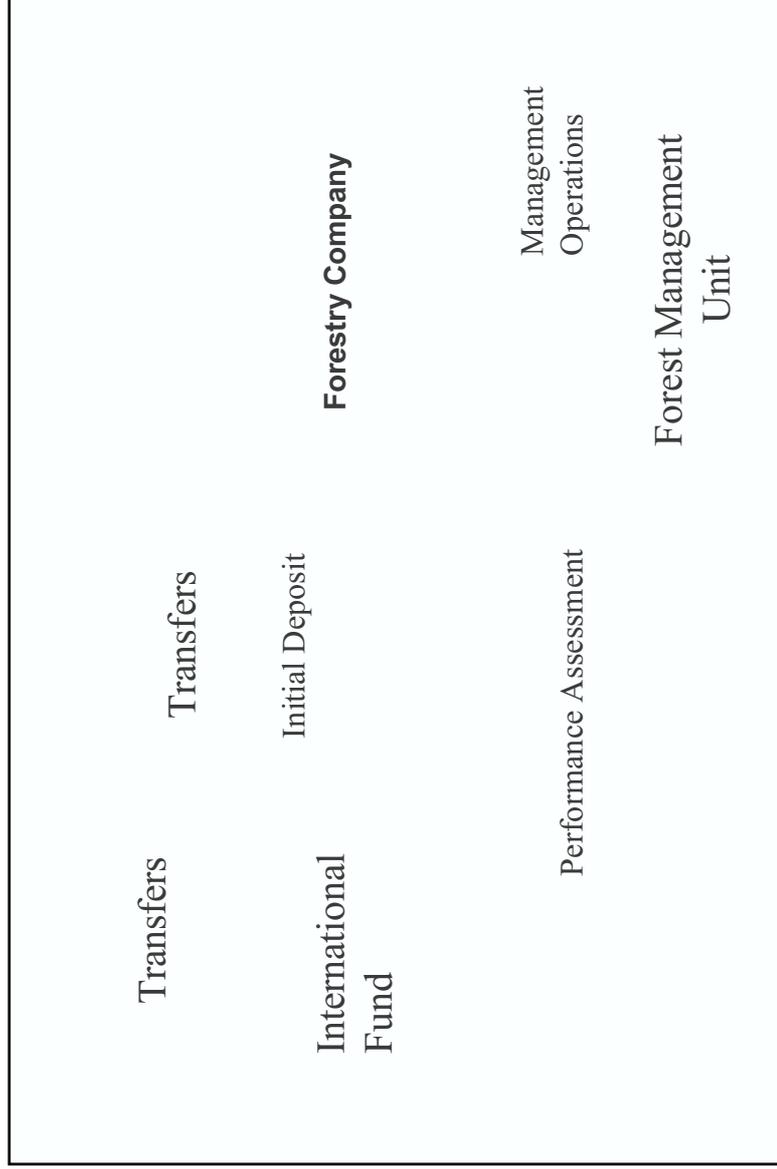
In the final analysis, everything depends on the international community's "willingness to pay" to close the gap between global benefits (combating the greenhouse effect, preserving biodiversity, etc.) to be derived from better management of the tropical forest, and the revenues foregone by private operators if their earnings are restricted to the sale of wood (raw or processed) that they take from natural forests. The financial tools already exist for arranging the transfer of funds from developed countries to developing country producers of tropical wood. The "debt for nature" swap system might be one of the instruments for feeding this special fund. A portion of GEF (Global Environment Facility) funds could also be devoted to financing the mechanism: the adoption of operating methods that minimise the loss of biological diversity could turn out to be more costly than normal operations (incremental costs), and that would trigger eligibility under the mandate of the GEF.

Setting up such a mechanism based on multilateral co-ordination of the efforts of governments and international organisations or funds would also face the challenge of moving towards the establishment of an international system for forests, i.e. one that shared the same standards, principles, rules and procedures aimed at directing the relationship between "shareholders" in a transnational asset (Badie and Smouts, 1995).

⁵⁴ It is another of the drawbacks of certification that it rests on "certifying" bodies: private firms competing on the certification market whose profit margins will depend on the number of certification exercises they conduct. Insofar as it is logging companies themselves that choose and pay their (FSC-approved) certifying institutes, it is likely that evaluators will tend to soften their demands considerably to avoid losing future clients who might be put off by a reputation for excessive severity.

⁵⁵ See for example Buttoud (1997), Faysse *et al.* (1997), Karsenty (1997).

Figure 8.2 Financial incentive mechanism



A scenario with major implications

9.1 The international market in greenhouse gas emission permits

Among the issues at the Kyoto summit in late 1997 on ways of combating the greenhouse effect (the likely cause of global warming) several countries, led by the USA, proposed setting up an international market in emission permits for greenhouse gases (especially carbon dioxide, CO₂), along the lines of the American market for sulphur dioxide emission permits (dubbed “right to pollute”). This has been functioning since 1994, and has led since then to a reduction of 30% in emissions of this gas in the United States. The scenario for establishing an international market in CO₂ emission rights runs roughly like this: each country would be given an initial emissions quota, according to criteria to be negotiated (current levels, level per capita, degree of development, voluntary reduction commitments, etc.). Countries that use less than their full initial emissions quota would be able to sell rights to countries that want to emit more CO₂ than their quota would permit. As a corollary, developed countries would be able to credit their account for any emission reductions that they financed in developing countries (Falloux, 1997).



What might be the implications of such a system for timber-producing countries? The Kyoto protocol on climatic change, in article 12, envisages the establishment of a Clean Development Mechanism intended to allow funds to be deployed in favour of sustainable development and to meet the emission reduction targets negotiated at international level in the most economically efficient way.

The Clean Development Mechanism (CDM) is similar to the “joint implementation” (JI) formula applied to greenhouse gas reduction targets in that it provides for transfers of funds and/or technology between countries, or between a firm and a country. The explicit reference to development constitutes the fundamental difference between the CDM and the JI mechanisms, as the

latter are designed, in the Kyoto protocol, simply as a way for countries (or firms) in Annex 1 (the industrialised countries) to fulfil their emission reduction commitments more cheaply.

Table 9.1 Comparative estimate of the cost of CO₂ "sequestration" by forest projects and costs of reducing emissions through energy projects

	Ton CO₂ equivalent
Tropical forestry	From \$2 to 25
Forestry (industrialised countries/transitional economies)	From \$5 to 81
Energy projects in developing countries	From \$36 to 376 (emission reduction > 20%)
Energy projects in developed countries	From \$70 to 220 (emission reduction > 20%)

(Smith *et al.*, 1998, compiling various sources)

In order to acquire rights and avoid (or defer) costly technological adjustments to reduce their greenhouse gas emissions, companies could be induced to acquire emission rights (in the North) by financing operations (in the South) aimed at "stocking" or "saving" carbon,⁵⁶ such as pulp and timber plantations, forest conservation, or "reduced impact logging" projects (which include strict planning of the road network and skid trails, directional felling, special hauling techniques, etc.) which, if introduced, would lead to lower CO₂ emissions than in a "no project" situation (Putz and Pinard, 1993).⁵⁷ In short, it is the difference in marginal stocking (or non-emission) costs of a ton of CO₂ between various parts of the world and sectors of activity that would, under such a system, be the engine for transferring funds from countries seeking emission permits to other countries.

⁵⁶ Forest plantations and young natural forests alike remove or "sequester" CO₂ from the atmosphere during the trees' growing period. A mature natural forest is virtually balanced from the viewpoint of the exchange of oxygen and carbon dioxide. In the case of plantations, while we may speak of "storing" CO₂, in the case of forestry management and conservation it is really a question of "saving" CO₂, i.e. limiting or avoiding the release of the carbon sequestered by the ligneous biomass, particularly the massive releases deriving from uncontrolled logging, forest conflagrations and the clearing of forests for land conversion.

⁵⁷ The Kyoto protocol makes no explicit provision for the conservation of existing forests, article 12 mentioning only tree planting and afforestation projects. However, there is room for interpretation as to the applicability of the mechanism to forestry. The conservation of forests threatened by competing land uses helps to reduce CO₂ emissions (in comparison with a "no project" situation) and also helps to retain other environmental benefits (biodiversity in particular). The leading international conservation NGOs are demanding that this type of conservation activity should be eligible under the CDM.

9.2 Could an incentive system produce a “double dividend”?

With the planned introduction of tradable greenhouse gas emission permits, new funding potential is opening up for forest management. The sale of unused emission rights by the South to the North could provide some of the necessary funds, if developing countries were to use a fraction of the receipts from such sales to developed countries to contribute towards the fund allocated to the operation of the performance-indexed incentive mechanism whose principles were set forth in the previous chapter.

Where the logging of natural forests is concerned, bringing the Clean Development Mechanism (CDM) within an incentive scheme based on performance assessment could represent a powerful instrument geared towards achieving a “double dividend”, with operations simultaneously aiming at CO₂ saving and improving forest management. The incentive mechanism, designed to pay attractive interest rates on compulsory deposits, could provide the linchpin for establishing the CDM by also drawing in private funds from outside the forest sector to finance operations to store or “save” greenhouse gases in various types of forest projects. The latter seem particularly well placed to benefit from this mechanism, but the many different possible operations (industrial plantations, agroforestry, improved logging methods, etc.) mean that there has to be a system of co-ordination and bringing together supply and demand for financing, acting as a kind of stock exchange. Without such a forum, operators (or indeed local authorities at municipality or village level) looking for financing to carry out this kind of project would find it extremely difficult to make themselves known and gain access to information about potential financing.

Assessment of “performance” must necessarily take account of the effects of logging practices, management of wood lots, processing efficiency and silviculture which all have an impact on the release or storage of greenhouse gases in the short to medium term. A system of performance bonds would enable “double dividend” projects and activities to be financed, both minimising environmental damage caused by logging methods and encouraging the adoption of measures to save or store CO₂ (enrichment plantations in the natural forest, selective silviculture boosting biomass, utilising waste wood to produce energy, etc.). Evaluation of operators’ environmental performance could then extend to the “CO₂ balance sheet” of activities undertaken. The attraction of integrating the two types of mechanism lies in the fact that economic agents would be able to obtain funds to finance projects with a global impact (environment and carbon) through the direct participation of an investor (who would obtain emission rights in exchange); as such investment enables better environmental performance to be achieved (meaning that objectives converge), the financial gains from the performance-indexed scheme will increase and boost the profitability of long-term resource management.

Box 9.1 The value of a ton of stored CO₂

There are two methods to assess the value of a ton of carbon stored by a forest. The first one called the dose-effects method, tries to assess in financial terms the environmental damages resulting from greenhouse gas emissions. But such an assessment is very difficult, given the huge scientific uncertainties about the magnitude and the consequences of climate change. It is also affected by serious methodological problems with the choice of discount rate and the financial valuation of non-monetary goods and services. – e.g. “existence values” of some collective heritages. The second, alternative, method involves calculating cost of storing one ton of carbon, or to avoid its release in the atmosphere. This method is called “preventive expenditure”, and it appears to be the most realistic one.

Under the latter method, the value of one ton of carbon stored represents the cost of using the most efficient means available to reduce the level of carbon dioxide in the atmosphere by an equivalent amount: more accurately, it represents the marginal cost of such a reduction up to a selected percentage. For example, if it were decided to reduce the level of CO₂ by 15%, the marginal cost would be the cost of eliminating the last ton within that 15%. The marginal cost of a 15% reduction is higher than the marginal cost of a 5% cut, inasmuch as in-depth measures will be needed in the first case. Some of these measures will involve high social and economic costs – such as the review of transportation schemes. If the target is relatively low, adjustments can be made at low costs.

The value, then, depends on the socially defined target for the acceptable level of CO₂, which was one of the topics of debate at the Kyoto conference. It means this value will reflect collective choices under a given state of technology. The value will also depend on the cost-effectiveness of the technologies and/or social measures employed. Furthermore, it depends on the breadth of the “market” where carbon emission reduction or sequestration will be implemented. If emission reduction objectives were the same elsewhere, the marginal price of a stored carbon ton will be generally higher in industrialised countries than in developing countries. In the latter, room for improvement at lower cost is more likely than in some industrial countries where “ultimate measures” might be costly. A “universal” carbon market would tend to lower the carbon unit price, since it will offer opportunities to undertake emission reduction at the lowest possible cost in the world.

Under a “universal carbon market”, estimates range from \$10 to \$60 for the value of the carbon ton sold on such a market (Lescuyer, Locatelli, 1999). But these estimates could change significantly if developing countries would accept quantitative objectives of emission reduction or mitigation – what they have rejected in Kyoto.

G. Lescuyer (1997), after summarising the literature on the question, has proposed setting an average value of \$750 per hectare for the carbon-fixing function of the tropical forests of Central Africa.

If the CDM were to be established – and this is still only a reasonable assumption although the principle of tradable permits was accepted at the Kyoto summit – it poses nevertheless some significant problems from the standpoint of ethics and of the concept of international relations founded on the sovereignty of nation states. First of all, there is the dubious principle of allowing the richer countries to avoid changing their lifestyles and economic habits by purchasing “rights to pollute” in different parts of the world. The major issue in the Kyoto and Buenos Aires negotiations was indeed the level of voluntary commitments to reduce emissions by the year 2010. If countries of the North, which are responsible for the bulk of emissions in absolute terms and which moreover have the financial means to buy large quantities of emission permits, are willing to set themselves major reduction targets, these objections would be partially overcome.

9.3 Limits of the system: “additionality” and “leakage” clauses and problems of legitimacy

Projects eligible under the clean development mechanism (CDM) are subject to explicit conditions in the Kyoto protocol, in particular “additionality” and “leakage”. The additionality clause is simple in principle, but may be difficult to apply in practice.

Projects may not receive CDM funds unless their promoters are able to put a figure on how much more greenhouse gas could be stored or saved than if there were no project. This implies, for example (Smith *et al.*, 1998), that a conservation project would only be eligible if it could be proved that the forest would have been cleared if there were no project... In the same way, a plantation project can only be eligible if its profitability cannot be guaranteed without financial assistance from the CDM.⁵⁸ The intention, therefore, is to avoid funding activities that would have been undertaken in any case without CDM subsidies. Everything hinges on assessing “reference scenarios”, or the most likely situation if the project were not implemented.

The “leakage” clause, on the other hand, is intended to prevent carbon sequestration projects from simply shifting greenhouse gas emissions to other geographical areas instead. Smith *et al.* (1998) chose the example of a rural community protecting a threatened forest area in order to receive CDM funds, but then clearing other parts of the forest. The “reversible” nature of forestry projects (a plantation or natural forest can always be destroyed by fire or converted to other uses) also limits the potential scope of the CDM in terms of its ability to attract considerable amounts of funds to the forest sector.

⁵⁸ Conversely, this mechanism may be extremely useful as an incentive to plant slow-growing trees intended for future timber production (okoumé, moabi, etc.), rather than fast-growing species for pulp manufacture.

Apart from worries as to how permanent forest projects designed to store CO₂ will be, these eligibility criteria, requiring the development of specific methodology, must temper enthusiasm for a mechanism sometimes seen as a “miracle solution” for tropical forestry. On the other hand, the CDM can act as an additional economic incentive which, used in combination with environmental taxation and other mechanisms based on rewarding performance, could redirect the choices and trade-offs made by a number of users of forest resources towards more long-term management.

This leaves matters of legitimacy related to land use. The problem refers to the counterpart to countries or firms in the North purchasing emission permits in the South. What would happen, for example, if the main forested areas of Central Africa became the target of deals to ban all logging, in order to keep them mainly as “carbon sinks”, with a Northern country or firm buying emission rights from governments in the region that imply keeping those forests out of production (since logging or conversion would be vectors for CO₂ emissions)? On one hand, the amounts at stake could be quite considerable and, on the other, an international player (government, company, organisation) could end up buying rights over the use that is made of a considerable geographic portion of a nation state, which might be seen as taking effective control over the territory of a sovereign country. Of course, fewer and fewer people are today upset at the now-routine inclusion of “conditionality” clauses in international financial arrangements (access to funding from multilateral or bilateral donor agencies). The fact remains, however, that the legitimacy of these practices is not (yet) generally secure, that the sovereignty principle remains the touchstone of international relations, and that the tropical forest has not yet, by a long chalk, been accorded the oft-promised status of a “world ecosystem”.

Conclusion

In forestry, economic instruments have rarely been viewed as forest management tools. Traditionally, management has been a technical matter for the forestry industry and institutions, and the field of forest economics is at best a kind of aid to decision-making, while the use of economic and financial tools is assumed to be fairly neutral as regards management methods, which are supposed to derive from government regulation and planning. Economic authorities thus have a tendency to restrict the role of taxes or quasi-taxes to funding the state budget, without considering the possibilities of using them to influence the practices of economic agents.

These perceptions are now gradually being changed, with the growing recognition of the complex interaction between natural dynamics, on one hand, and social and economic dynamics on the other. In a context marked both by uncertainty (about the viability of logging methods) and by constant change (in markets and technology), planning and regulation must be bolstered by flexible and adaptive instruments that will often rely on market mechanisms.

As the interests of private economic agents, whether as loggers or logger-processors, are not necessarily consistent with the demands of sustainability, the purpose of forestry policy is to reduce the gaps. Regulation is absolutely essential, but experience shows that when it comes to natural resource management, there are no regulations that stakeholders will not try to circumvent. In the context of Central Africa, where typically weak governments are confronted by multinational companies of considerable financial strength, the limits of relying on regulation are clear. Incentive devices need to be carefully designed so that companies have a greater interest in complying with them than in flouting them, as we wrote a few years ago (Karsenty and Maître, 1993). With the gradual introduction of new legislation imposing forest management obligations in most countries of the region, the economic tools used by governments will have to be brought up to the demands of that legislation, and tax systems must no longer be looked on merely as sources of budgetary revenues.



Taxation, in particular, is an economic and environmental policy tool, which has a structural impact in that it sends “signals” to economic agents. These signals are expected to bring about changes or adjustment in operators’ choices and practices. As part of this dynamic process, forest taxation becomes the vector of possible changes in the economic structure and patterns of forest management. The dynamics of taxation imply that, when thinking about forest policy, the need for companies to change and adapt and the capacity of economic agents to react – which cannot altogether be determined *a priori* – must be taken into account. Appreciating the ability to adapt and innovate in response to a change in the prevailing economic conditions is an especially delicate aspect on which the analytical skills of a whole range of experts and professionals, market specialists, technologists, specialists in industrial organisations and so forth need to be brought to bear. The dynamic nature of taxation also means that economic and other forest management instruments (including regulation) make up a set of interacting elements: in other words, they represent a system whose effects are, as a rule, predictable. If the “systemic” dimension of forest management instruments is taken into account, it is possible to adjust the components internally (shifting the tax base in accordance with changes in the status of the forest resource, moving from a fixed royalty type instrument to a more flexible auction type instrument, etc.) without altering its overall functions and effects. Within that framework, different combinations of instruments can be tried at different times, while the instruments themselves must be adapted in line with new situations, institutional changes, operators’ learning processes and government’s ability to use the various tools appropriately.

The lack of comprehensive information and the highly variable context call for the adoption of flexible systems for “guiding” management in the forestry sector, and market mechanisms can provide the answer. The market will sometimes provide the information (such as an operator’s willingness to pay for logging rights to a certain tract, or for the right to export a given volume of logs) that deficient government statistics systems are unable to offer. Whenever possible, market mechanisms should be introduced in place of administered systems, auctions in place of royalties, marketable permits in place of taxes. Care must be taken, however, not to confuse efficiency with ideology: a mechanism may be theoretically efficient, but the economic, political or institutional conditions may not be ripe for it to work, and serious prior study will need to be undertaken to determine whether it will be feasible in one country or another.

All the same, market mechanisms are, and should always be, overseen by a regulatory policy defined and implemented by government. As F. Rachline (1996) has noted, “Regulation by the market (...) also implies regulation of the market. A market, regardless of what type, is not an unorganised set of economic flows or chance meetings between protagonists. There is no market without administrative regulations, without legal and tax rules, without an organised place of exchange, without assurance of recourse, without specific

legislation governing the trade, without a defined relationship between buyers and sellers, without financial rules, without accounting rules, without advertising, without a multiplicity of players (competition), without a (more or less explicit) code of conduct, etc.” (page 75). Government intervention must be aimed at organising competition where it is needed to encourage innovation and economic efficiency and to establish the operating procedures of markets set up to allocate rights to exploit and export forest resources.⁵⁹ This means that governments must acquire the ability to use these economic instruments effectively, which is not currently the case. It would be a tragic misunderstanding to think that the competition needed to maximise the value of forest resources depends on rolling back the state and privatising its main functions. The organisation of competitive markets, and of fair, transparent procedures for allocating resources, implies that the public authorities must genuinely control the mechanisms. The delegation to private companies of important control and statistical information functions in the industry that we are now seeing in Central Africa is not, therefore, a problem in itself **provided that governments retain the means of “controlling the controller”** and can really use the information produced in designing policies and procedures. Without that ability, there is a risk that a private company in a monopoly position and exerting powerful influence over the government will fall back into the rent-seeking ways of some of the public companies dismantled through structural adjustment.

Economic instruments, whatever their potential effectiveness, cannot be seen as a substitute for conventional means of control in the field and the organisation of production within forest management plans. As regards the production of timber (which is only one aspect of forest management), we may add that this policy must involve, first of all, placing a global limit on the allowable cuts in the natural forest and on the areas open to logging, and there must be generalised resource management obligations. Economists are not in a position to advise on the immediate content of these measures for preserving the natural heritage, which must be examined in accordance with the precautionary principle, given the uncertainties about the future development and use of forest resources. Countries that have managed to preserve large tracts of forest, “CO₂ sinks”, may perhaps be the major beneficiaries of the transfer of funds should an international market for greenhouse gas emission permits be established.

The globalisation of forestry issues, expressed in the internationalisation of the debate over forest policy or in the negotiations on the greenhouse effect and possible measures to combat it, is a double-edged sword: on one hand, it may

⁵⁹ In a document which constitutes an avowed criticism of some World Bank and IMF policies, J. Stiglitz (1998), Chief Economist at the World Bank, has claimed that the “Washington consensus” was based on a confusion between privatisation and promoting competition, the latter alone being able to generate economic efficiency. In Stiglitz’s view, far from having to roll back, the state must organise such domestic competition that can perfectly well co-exist with protection against outside competition: there again, the important thing is competition as the source of innovation, not commercial freedom in itself.

in some cases threaten the sovereignty of nations in the South, while it may, on the other hand, represent an opportunity to obtain funds for sustainable development. It is often the process of negotiation and working out agreements on objectives and procedures that gives one meaning or another to the tools that will be used, and defines their degree of “acceptability” to the negotiating parties as a whole. We may assume this at least for some of the potential instruments discussed in this paper, such as performance bond incentive systems or markets for tradable emission permits. The countries of the South should not reject these instruments out of hand, but rather negotiate the conditions for putting them into effect, learn to use them and take control of them, if they want to keep decisions about the future of their forests and their economies in their own hands.

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Annex 1

Value added and opportunity cost in processing: facts and figures

The opportunity cost relates to the difference in revenues resulting from the choice of one option over a second, where the two options are mutually exclusive (i.e. implementing one precludes implementing the other). This is the case for a logger-processor who has the choice of exporting a portion of his output in the form of raw wood (the higher quality logs for which there is an export market), or processing it at home. Each of these activities produces revenues that will have to be distributed between labour (as wages), capital (as profits) and the government (as taxes and royalties). This example relates the case of a company operating in Central Africa. The figures relate to CFA francs prior to devaluation.

The “logs” column shows values for 2.4 m³ of logs, a figure that reflects a recovery rate of 42%, which is the norm in Central Africa. The hypothesis is that the two goods are **perfect substitutes**. This is not true for output as a whole, but it can be demonstrated for the better-quality logs that could either

Table A1.1 The economic approach (value added)			
In FCFA per m³		Plywood	Logs (2.4 m³)
FOB value of main product		241,800	264,000
Value of secondary products		22,000	
Intermediate consumption 1 (logging)	<i>Fuel</i>	(5,954)	(5,954)
	<i>Consumables</i>	(2,911)	(2,911)
	<i>TFSE*</i>	(9,734)	(9,734)
	<i>General expenses</i>	(11,952)	(11,952)
Intermediate consumption 2 (manufacturing)	<i>Fuel, lubricants</i>	(12,447)	
	<i>Glue</i>	(27,346)	
	<i>TFSE*</i>	(13,649)	
	<i>General expenses</i>	(26,000)	
Transport subcontracting		(37,000)	(88,000)
<i>Gross value added</i>		116,807	145,449
Depreciation, logging		(5,832)	(5,832)
Depreciation, manufacturing		(9,358)	
<i>Net value added (**)</i>		101,617	139,617
Balance		(38,000)	

* External services, works and supplies, i.e. services bought in by the company from outside.

** Calculated with the value of depreciation, which is merely the conventional tax-accounting approach to the annual consumption of fixed capital, the only relevant value for calculating a true net value added.

be processed locally or exported as such.⁶⁰ The task then is to calculate the opportunity cost of 100% local processing (which would happen if there were a total ban on log exports).

To compare the two options without distortions introduced by tax systems that can change quickly and have a heavy impact on earnings, we have excluded taxes and royalties from the calculation. In calculating the net value added, we have taken the accounting depreciation period: this is not entirely satisfactory, but we have no data on the real useful life of the fixed assets. Note that the gross value added by the “transport” branch was not considered, since we are interested here in the value added by the company itself. If we were looking at it from the national viewpoint, we would have to take account of value added in the “transport” branch. Transporting logs in fact generates comparatively more activity (and hence more value added) than transporting the processed product. Of the operating proceeds of the road transport of wood, close to 70% is made up of gross value added (including depreciation) (Laurent 1994). To take account of the additional contribution of the “logs” option to gross value added, we would have to add 70% of the value of the difference in transport costs, or:

$$(88,000 - 37,000) \times 70\% = \text{FCFA } 35,700$$

Calculating the net value added (excluding depreciation), besides being more satisfying from an economic viewpoint, would reduce this additional contribution substantially, since equipment depreciation is clearly a major item in road transport. In the absence of more accurate data on the structure of gross value added, we shall not attempt that calculation.

⁶⁰ The objections could be raised that if only the higher-quality logs are considered, the yields will be higher. Yet, according to the CIDA report (Duscheneau and Méthot, 1993), “while it is very difficult to assess the real impact of an improvement in the quality of sawn logs on recovery rates in Cameroon, the mission nonetheless believes that it would be technically difficult for these to exceed 40 to 45% for exported products and 50 to 55% for products to be used locally (...)” (p. 30, vol. 2).

Table A1.2 The taxation approach			
In FCFA per m³		Plywood	Logs (2.4 m³)
<i>Average FOB selling price</i>		241,800	264,000
<i>Value of secondary products</i>		22,000	
Logging costs		(49,830)	(49,830)
Manufacturing costs	<i>Fuel, lubricants</i>	(12,447)	
	<i>Glue</i>	(27,346)	
	<i>TFSE*</i>	(13,649)	
	<i>General expenses</i>	(26,000)	
	<i>Local personnel</i>	(24,000)	
	<i>Expat. personnel</i>	(8,350)	
Financing costs		(11,746)	
Depreciation provisions		(9,358)	
Transport		(37,000)	(88,000)
Loading, unloading		(6,474)	(6,158)
Total FOB cost		(9,857)	(13,853)
<i>Current earnings before tax</i>		27,743	106,159
Proceeds from income tax at 50%		(13,872)	(53,079)
Differential (gain/loss to govt.)		(39,208)	
Labour income (manufacturing wages)		33,350	
Potential loss of distributed earnings		(6,858)	

* External services, works and supplies.

The remuneration of production factors is accounted for via the wages to labour. The potential loss of distributed earnings corresponds to the balance of the earnings differential (revenue foregone by the government through the choice of processing) and wages paid to labour (number of jobs expressed by labour income per m³).

The “potential capturable rent” relates to the revenues that the government could obtain from an appropriate tax (to simplify things, we assume here an income tax on forestry companies). Note that in general a “fair” tax is considered to be one that is lighter on processed products (in recognition of the additional risks in processing), a view that we have not taken into account here, so as not to put processing at a disadvantage in government eyes (from the viewpoint of maximising government revenues). For the sake of demonstration, we have ignored the various types of taxes and assumed that government revenue is calculated on the basis of 50% of potential earnings, which are close to what would be regarded as the direct profit margin of an activity (earnings less operating costs and activity-specific structural costs).

Interpretation

The operator has the choice between exporting 1 m³ of plywood or 2.4 m³ of logs. We therefore analyse the cost-benefit ratios of these two options.

The potential loss of distributed earnings expresses the fact that, **under our assumptions about prices and recovery rates**, the government would lose potential *distributed earnings* of more than 6,800 FCFA⁶¹ per m³ of plywood produced, if it decided to process **all** logs locally rather than export them, or to export only a portion. In other words, if the portion of the rent captured by the government were entirely devoted to creating jobs (public works, for example), the export of logs would allow more jobs to be created than would the local processing option (although not in the same sectors of activity). We do not consider here the government's actual ability to create jobs, i.e. we make no assumptions about how the additional revenues will be used: additional job creation is only a possibility, not a mechanical consequence of the calculation.

Comments

Care should be exercised in interpreting these tables: the final result will be highly sensitive to relative prices for processed products and for logs. If we keep our pricing assumption, we find that the result shifts in favour of processing (in terms of maximising potential distributed earnings) if the recovery rate rises from 42% to 56%. An increase in co-utilisation (using by-products from the main processing) will work in the same direction. In the case of 100% processing, it is possible that the physical recovery rate from processing the higher-quality logs (the **marginal** recovery rate) could approach this level, without any change in processing equipment. This remains to be demonstrated, however.

Note that the calculation relates ideally to only **one portion** of output (exported logs). We should not conclude, then, that the best strategy would be to sell all wood in the form of logs, but it is well to be sceptical about the advisability of **total** local processing of the timber harvest.

We may conclude that **it is not correct to claim that local processing maximises value added**⁶² in all situations. It does so only under certain assumptions about prices and the efficiency of the processing industry.⁶³ Moreover, even if we only take the economic view, an industrial policy must be able to **adjust to market**

⁶¹ For lack of accurate data, we have not considered distributed earnings from transport wages. Transporting the logs to port, while it is costly for the operator, generates higher turnover of trucks (or trains) and additional wage payments (hiring workers or paying overtime) for carrying the additional volume. Leaving this aside works in favour of the "processing" option in the calculation here.

⁶² Value added represents the value of output less the value of intermediate consumption. It may seem odd to speak of value added in the case of log exports, but all we need to do is take logging and transport costs as "intermediate consumption" to be able to compare the two options.

⁶³ The same calculation applied to veneer-making (primary processing) might be more supportive of the processing option.

swings, and to use temporary comparative advantages that may appear in world trade. Log export restrictions (high taxes or a ban) risk creating an inefficient industry, by lowering the price of logs domestically (thus reducing incentives to enhance the efficiency of processing), by freezing the structure of external trade (leaving fewer possibilities to benefit from relative price changes), and by reducing the chances to adjust the allowable cut to changes in the resource base and in future demand (the “irreversibility” risk, linked to the need to protect jobs in the industry).

In fact, we are faced with a classic choice between efficiency and equity. By allowing the market to determine the balance between the proportion of wood exported in raw form and that processed at home, we maximise wealth creation, consistent with the principle of comparative advantage. But in this case (if the proportion of log exports is high), the distribution of value added will be in favour of profits and the government (through taxes on the exported logs). Total domestic processing reduces the total share of potential earnings, but changes the distribution of value added, increasing the share going to labour, since processing involves paying wages to factory workers. What we have, then, is a problem of distribution. The government (in theory) can restore the balance through income distribution policies (creating jobs in the public sector, etc.). Of course, there is nothing to guarantee that it will adopt such a policy, but the alternatives, and their economic implications, are quite clear.

Annex 2

Dynamics of a decreasing tax on value added in processing

The decreasing tax rate affects only a fraction of timber output, which can either be processed locally or exported as logs. This mechanism could, however, be extended to all forestry output, if there were a real domestic market for logs, and if market prices existed for categories of logs other than those for export.

This taxation system cannot represent the entire tax take, and it should be used in combination with other taxes (based on concession area, volume or value of harvest, etc.). It is aimed at encouraging the less efficient industries to raise their value added in processing, or to abandon those processing activities where there is an opportunity cost (i.e. where the processing of logs generates less revenue for the country than the export of those logs).

Suppose that a sawmill is processing wood with a recovery rate of 35% for sawn timber destined for export. It uses a certain volume of logs in this processing, classified by categories. Exported as logs, the volume used to produce the sawn timber could have been sold at a value of V_l (Value as log) on the international market. As sawn timber, the value of the wood exported becomes V_s (Value as sawn timber). From the national viewpoint, processing produces no additional wealth unless $V_s > V_l$ (taking into account the currently very weak spillover effect of local processing in Central Africa).

From the entrepreneur's point of view, there are other factors to consider in his calculation of the opportunity cost, in particular the relative costs of transportation and of processing (and, in practice, the tax regimes that generally impose high rates on log exports). But the opportunity cost to the company is not necessarily the same as that to the country.

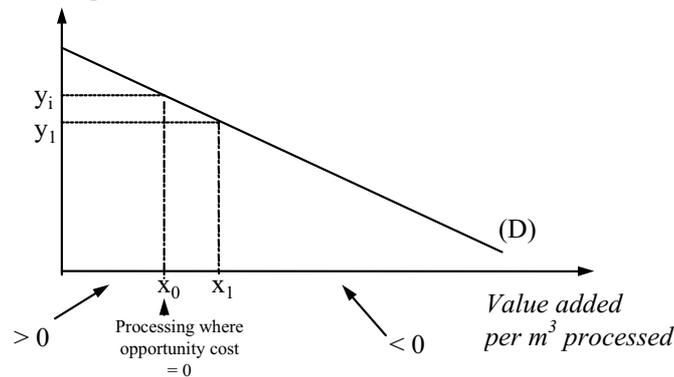
To introduce a decreasing taxation system, a convention can be adopted whereby value added is deemed to be zero when the social opportunity cost is zero, i.e. when $V_s = V_l$. Processors who, thanks to new investment or skills upgrading for their staff, increase their recovery rate (or introduce a processing line to utilise waste to produce mouldings, for example) should, under this system, enhance their tax situation (if the differential in the FOB price between logs and sawn timber does not change to the detriment of the latter).

Scenario 1

Under the first (simple) scenario, the two major parameters that might be negotiated with operators are the slope of the curve and the tax burden at the time of introduction (x_0 in the following figure).

Figure A2.1 Decreasing tax rate geared to value added – basic principle

Tax burden or equivalent



The slope of the curve determines the degree of incentive and penalty: the steeper the slope, the more heavily inefficient units will be taxed, and vice versa.



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The second option is to determine the value of y_i , the tax burden at x_0 , the linchpin of the tax system. Here we encounter the classic problem of determining an optimal tax level with imperfect information. It will depend on the government's objectives and on negotiations with the operators. We might also add a point that will be valid for the second scenario as well: a cut in the value of the tax must be applied as a function of transportation costs, so as not to impose a severe handicap on investment projects in more remote areas, where in general the most important forestry resources are to be found. There are several ways to do this: dividing the country into homogeneous zones, using an actual mileage basis, stretches of 100 miles, etc.

Scenario 2

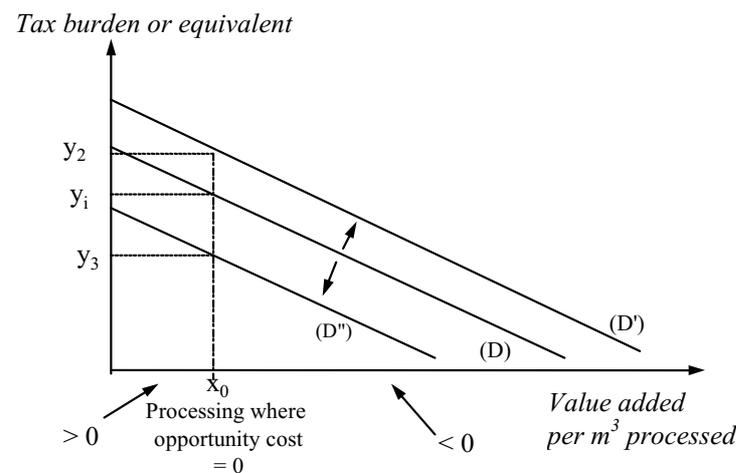
We can build a second scenario, rather more sophisticated, that could appear if the country were to adopt a quota system for log exports (with annual physical quotas) and decide to introduce a market in export permits, such as this paper recommends. In this case, the average rate (the value of the export permit for one m^3 of logs) is set by species and by category. The value of these rates can serve as a basis for fixing y_i initially, i.e. the tax rate at point x_0 .

The objective here is that, *ceteris paribus*, and with standard recovery rates set for each category of processed product, a processor operating under average conditions for the industry (say a recovery rate of 40% for sapelli sawn wood) and producing one m³ of *sapelli* sawn wood with zero, but not negative, value added (at the social opportunity cost, according to the previously defined convention), will pay a tax. The amount of this tax corresponds (on average) to the outlay that he would have had to make to buy the right to export 2.5 m³ of *sapelli* logs of the same quality as he has sawn. Under these conditions, solely from the taxation viewpoint, it would make no difference to the operator whether he processed these 2.5 m³ into sawn wood, or exported them in their raw state.

As with the first scenario, a rebate can be offered, proportionate to the distance covered in carrying the processed products to port, so as not to penalise remote zones, while taking account of the fact that an operator who decides to engage in processing would in any case benefit from transport costs that are lower for sawn wood than for their roundwood equivalent. The system thus provides, from the outset, a premium for processing, a premium that rises with the distance from the mill to the port.

If the efficiency of processing is enhanced (or there is simply a change in prices in favour of processed products), the operator cited above will slip to x_1 : the value of his output will have increased for the same value of roundwood consumed. The level of the tax to be paid in this new situation will be y_1 . The value of y_1 will be a function of the slope of the curve, a slope that may have been negotiated in advance and calibrated accordingly; y_1 will represent a value (virtually arbitrary, since it depends on the slope of the curve) for the right to export a certain volume of logs. The only condition to be respected is that $y_1 < y_i$, i.e. the tax burden declines in comparison with the initial situation.

Figure A2.2 Increase/decrease in the value of log export rights



The value of log export rights or duties can also vary. If average values (as calculated over the last three months, for example) should rise, the tax rate increases uniformly for all values of x_1 . **The straight line (D') is parallel to the initial straight line (D), but its origin is different.** The relative scarcity of the raw resource, as reflected in a rise in the value of export rights, increases the tax burden on the industry and makes the position of the least efficient operators particularly difficult, thereby opening the way to a shakeout and restructuring in the sector.

Conversely, it may be that the market value of logs will sink, bringing with it a drop in the value of log export rights (straight line D"). A gradual shift of operators' activities towards processing, or increased efficiency in processing methods, could also lead to a relative drop in the demand for wood on the domestic market, and to a fall in the value of export rights. In this case, the entire processing industry will see a decline in taxation, and there could be a consequent slowdown in investments to modernise production units, at the same time as government tax revenues are reduced. The solution then would be to issue a smaller number of log export permits at the next auction. The government would then be restoring relative scarcity, which would serve to increase the price of export rights, and this would in turn make itself felt in the tax burden on the processing industry.

This possibility of creating a "ratchet effect" (whereby the tax rate can only rise over time, in an x_i situation) should persuade operators that the only legal way to reduce their tax burden (or the equivalent on the market for log export rights) is immediately to increase the value added in their processing, by investing in modern equipment, training, and finding markets for new products.

Possible consequences for production competitiveness

Introducing such a mechanism, where taxation decreases as a function of increases in value added, may have short and medium-term effects on the international competitiveness of the processed products. The foregoing graphs show that the tax position of an operator situated to the left of point x_0 will be made more difficult by the system proposed. In such a situation, the operator has in theory three possible options, that may or may not be practicable depending on his circumstances:

- abandon the forestry business outright;
- abandon or temporarily suspend processing activity (perhaps involving only a portion of his output), and turn to buying log export permits;
- attempt to enhance his tax position and "slip" along the curve to the right of x_0 .

From the standpoint of competitiveness, there is no doubt that with the introduction of this mechanism a certain number of companies will see their tax burden increase, and may suffer a consequent decline in their international competitive position. But this situation is only temporary, since we assume that some operators will adopt the third solution, especially if the government makes clear its intention to reduce gradually the volume of log export quotas offered at auction.

In time, the initial loss of competitiveness for certain industrial units that rely on low-cost resources should be offset by competitiveness gains to units that have refocused their output on higher value-added products, and on activities utilising the by-products of processing. This is the strategy followed by Malaysia, despite having been the world's largest producer of tropical sawn wood until 1994 (Brazil has since taken its place), which has decided to phase out exports of sawn wood by the year 2000.⁶⁴ The government of Peninsular Malaysia is putting pressure on the sawmills to specialise further downstream within three years, or to go out of business. This will affect about one half of the 660 sawmills now in operation. This government intervention in the industry's management reflects a determination to rise above the country's specialisation in semi-finished products that provide disappointingly low value added and that are threatened with competition from substitute products. Thanks to this strategy, the value of Malaysia's wood exports rose by one-third from 1994 to 1995 (to a total of more than US\$ 7 billion), the value of furniture exports soaring by 51%.

The competitiveness of Africa's wood-based products cannot rest forever on the advantages conferred by a low price for the resource. Indeed, competitiveness on that basis will not be sustainable, since it relies on the relative abundance of the raw material (and more particularly, in the case of the Congo basin countries, on the logging of rich virgin forests or tracts that have been little touched in the past). The introduction of appropriate economic instruments **immediately**, giving operators an incentive to invest in value-added products, is essential to avoid future problems of adjustment to overcome the socio-economic inertia resulting from past choices. Whereas Malaysia, which has a chronic shortage of manpower, is now beginning a drastic reorientation of its industrial options, African countries, which have less room for manoeuvre economically and socially, will find it much harder to follow a similar path tomorrow.⁶⁵

Yet the fragility of the economic and social fabric of these countries, as they struggle to find their way out of a series of different crises, argues against the abrupt imposition of a system that would penalise a large number of wood processing companies that are now operating at a low level of technical and

⁶⁴ Which will likely lead to a drop of 50% in the production of sawn wood in Peninsular Malaysia!

⁶⁵ The problems of Indonesia, which is having trouble in extracting itself from its "all plywood" option, in light of the social constraints imposed by the arrival of more than 2 million new job seekers every year, suggest that we must not underestimate these effects of "path dependency".

economic efficiency. Transitional measures, allowing companies time to adapt to the change in taxation and industrial policy, could be introduced, accompanied by an assurance that they are indeed temporary, with a timetable for their gradual withdrawal. The possibility of fine-tuning the level of log export quotas (where the unit price determines the level of taxation paid by the processing companies in the mechanism as proposed) provides governments with a good way of ensuring that the tax rate on processing is low to start with (by setting relatively high log export quotas). They will then be able to push the level of taxation higher by gradually cutting back on the “supply” of export permits, which will lead, *ceteris paribus*, to a higher value for export permits and hence an increase in the level of taxes on processing units. As companies engaged in wood processing in Central Africa are virtually all exporters of raw wood as well, they can make internal trade-offs in the distribution of their activities, depending on trends in taxation and markets.

Economic instruments for tropical forests

Economic instruments – taxes, royalties, quotas, auctions, permit markets, subsidies, performance bonds, timber certification, log export bans, carbon dioxide markets – lie at the heart of contemporary debate over ‘sustainable management’ of tropical forests and especially one of its most controversial aspects: logging.

Drawing on economic theory and concrete examples mainly from Central Africa but also from south-east Asia, this book provides a pragmatic and stimulating view of the forestry policy issues bound up with these new aspects of tropical forest management at the crossroads of economics and ecology.

Instruments for sustainable private sector forestry series

Forests provide society with many goods and services. The private sector has come to play an increasingly dominant role in the production and distribution of many forest goods. Often, this has come at a price – environments have been degraded, social inequalities increased. Forest services that benefit society as a whole, notably climate moderation, biodiversity and heritage, are overlooked or undermined because they offer no opportunity for private profit. Securing these forest goods and services has traditionally been a government function. However, faced with limited resources, many governments now face the challenge of finding ways to ensure the private sector manages forests such that they that optimise benefits to society. Some industry leaders have already taken the initiative and are working towards better forestry.

This series of publications comprises both thematic and country studies. The studies aim to better understand private sector motivations and to identify effective market and regulatory instruments to ensure the private sector produces social and environmental benefits from forest management. By considering new instruments within the wider context of policy reform, the series aims to provide practical guidance on how best to ensure the private sector manages forest resources sustainably.

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