Center for International Forestry Research

CIFOR Occasional Paper No. 40

Exploring the Forest—Poverty Link:

Key Concepts, Issues and Research Implications

Arild Angelsen and Sven Wunder

ISSN 0854-9818

Front cover photos: Christian Cossalter, Reidar Persson
Back cover photos: Christian Cossalter, Edmond Dounias, Rona Dennis

Center for International Forestry Research
Mailing address: P.O. Box 6596 JKPWB, Jakarta 10065, Indonesia
Office address: Jl. CIFOR, Situ Gede, Sindang Barang, Bogor Barat 16680, Indonesia
Tel.: +62 (251) 622622; Fax: +62 (251) 622100
E-mail: cifor@cgiar.org
Web site: http://www.cifor.cgiar.org

Exploring the Forest—Poverty Link:

Key Concepts, Issues and Research Implications

Arild Angelsen
Associate Scientist (Economist), CIFOR
Bogor, Indonesia &
Associate Professor, Department of Economics and Social Sciences
Agricultural University of Norway, Ås, Norway

Sven Wunder
Scientist (Economist), CIFOR
Bogor, Indonesia

Contents

Acronyms and Abbreviations v
Acknowledgements v
Executive Summary vii
Abstract 1
1. Forests and Poverty—a Controversial Link 1
2. Defining Poverty in a Research Context 3
2.1 The traditional concept 3
2.2 Extending the poverty concept 4
2.3 Poverty and subjective well-being 8
2.4 Concepts and indicators: what to choose and how to measure? 10
2.4.1 Analysis vs. measurement of poverty 10
2.4.2 Degree of poverty 11
2.4.3 Absolute vs. relative poverty 12
2.4.4 Subjective vs. objective poverty measures 12
2.4.5 Forest definitions and poverty relevance 13
3. Causes of Poverty 14
3.1 Poverty and growth 14
3.2 Inequality and growth 14
3.3 Pro-poor preconditions and growth types 16
4. Using Forests to Cushion and Reduce Poverty 18
4.1 The forest-dependent poor 18
4.2 Non-Timber Forest Products (NTFPs) 19
4.2.1 NTFPs—a heterogeneous group 19
4.2.2 'Poverty traps' or 'safety nets'? 21
4.2.3 Fuelwood—the neglected pro-poor NTFP? 24
4.2.4 A synthesis and conclusion about NTFPs 25

4.3 Timber 26
4.3.1 Why have the poor not benefited from timber? 26
4.3.2 Can timber be made more pro-poor? 29
4.3.3 Forgotten indirect and off-site benefits? 32
4.3.4 Summary on pro-poor timber benefits 34
4.4 Payments for ecological services 34
4.4.1 What link to poverty? 34
4.4.2 Carbon storage and sequestration 36
4.4.3 Biodiversity conservation 37
4.4.4 Hydrological benefits 38
4.4.5 Forest based tourism 39
4.4.6 Can forest-service payments reduce poverty? 39
4.5 Summary 40
5. Future Research on Forests and Poverty 40
5.1 Research area I: Exploring the present pro-poor role of forests 41
5.2 Research area II: Emerging markets and opportunities 44
5.3 Research area III: Cross-cutting institutional and extra-sectoral issues 45
Endnotes 46
References 48
Appendix 1. Strategic Questions for Poverty-Forest Research at CIFOR 54

Figures

1. The Poverty—Well-Being Interface 4
2. Decomposing Social Capital from a 'Five-Capital' Perspective 6

Boxes

1. The 'Employment of Last Resort' Model 23

Tables

1. The Importance of Different Forest Benefits to Different Groups 19
2. Poverty-Related Forest Research—Topics, Research Methods and Priorities 42

Acronyms and Abbreviations

ACM	Adaptive Collaborative Management
CDM	Clean Development Mechanism
CGIAR	Consultative Group on International Agricultural Research
CIAT	International Center for Tropical Agriculture
CIFOR	Center for International Forestry Research
DFID	Department for International Development, UK
EPMR	External Programme and Management Review (CIFOR)
FAO	United Nations Food and Agriculture Organization
GBF	Global Biodiversity Forum
HDI	Human Development Index (UNDP)
HDR	Human Development Report (published annually by UNDP)
ICDPs	Integrated Conservation and Development Projects/Programmes
ICER	Internally Commissioned External Review (CIFOR)
IDS	Institute for Development Studies, UK
IFPRI	International Food Policy Research Institute
JI	Joint Implementation (private sector climate change initiative)
LULUCF	Land Use, Land Use Change and Forestry (in CDM)
MDG	Millennium Development Goals
NARS	National Agricultural Research System
NFPs	National Forest Programmes
NGO	Non-Governmental Organisation
NTFPs	Non-timber forest products
PAFSEP	Poverty Alleviation, Food Security and Environmental Protection (CGIAR)
PCA	Principal Component Analysis
PPA	Participatory Poverty Assessment
PPP	Purchasing Power Parity
PRSPs	Poverty Reduction Strategy Papers
SLA	Sustainable Livelihoods Approach
SSE	Small Scale Enterprise
SWB	Subjective Well-Being
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value Added Tax
WWII	World War Two

Acknowledgements

In its early stages, this document received valuable food for thought from an internal one day meeting about poverty, hosted by the Center for International Forestry Research (CIFOR) at Puncak, Indonesia, on 23 April 2001.

We are grateful for the external reviews by Mike Arnold and Manfred Zeller and for extensive comments from internal CIFOR colleagues, including Brian Belcher, Bruce Campbell, Carol Colfer, David Kaimowitz and William Sunderlin. We would also like to thank the UK Department for International Development (DFID) for their financial support.

Forests have both potentials and limitations in regard to poverty alleviation, with possible roles as safety nets, poverty traps and pathways out of poverty. Poor people living in and near forests (like this family in the Rio Capim area, Pará State, Brazil) are the ones who are most dependent upon forests for their livelihoods. (Photo by Sven Wunder)

Executive Summary

This paper provides an overview of issues, debates and research on the link from forest to poverty alleviation. Some of the key questions include: How do different poverty definitions affect the assessment of that link? What are the current major forest contributions to poverty alleviation—distinguishing between poverty *prevention* and poverty *reduction*? Why do the poor tend to depend more on forests? Does a high level of present forest dependence necessarily correspond to a high potential to reduce poverty through forests in the future? Are forest products safety nets or poverty traps? Can payment for environmental services help reduce poverty, while conserving forests? In general, how and to what extent can forests and forestry be made more pro-poor?

Poverty definitions have gradually been broadened over time from a 'materialistic core' to include an increasing number of 'soft' welfare elements, as exemplified by the so called 'five-capital' approach. However, this change has also come at the expense of tangibility, measurability and comparability. We stress the need to distinguish between the *analysis* and the *measurement* of poverty. It can be useful to think about poverty causes in broader terms (for example, the 'Sustainable Livelihoods Approach') but to measure it using indicators closer to the original meaning of the term.

Another key link that has a strong bearing on the poverty-forest debate refers to the empirical macro-level relationship between economic growth and poverty reduction. Many micro-level practitioners observe that new income sources only benefit the few. However, our review of the macro-level literature shows that economic growth more often than not does trickle down to the poor—and that poverty reduction *without* growth is in practice extremely difficult to achieve.

Our review of the actual and potential role of forests in poverty alleviation distinguishes three benefit categories: non-timber forest products (NTFPs), timber and environmental services.

NTFPs cover a wide range of products with different characteristics. Some of these serve subsistence needs, others have important gap filling or 'safety net' functions and a few provide regular cash income. Most NTFPs are labour intensive, require little capital and skills, are openly accessible for extraction from natural forests and provide generally poor prospects for market and price growth. Unfortunately, this combination makes the majority of NTFPs economically inferior products, yielding low returns for those engaging in their production and trade. Paradoxically, the characteristics that make NTFPs important and attractive to the poor are the same ones that limit the potential for increasing NTFP incomes. Yet, there are also some NTFP exceptions that fall outside this main pattern—these are managed more intensively, have better market prospects and/or provide higher economic returns.

If NTFPs have normally been the poor person's lot, it is the rich who have mostly captured the benefits from precious tropical timbers, due to a number of production and market characteristics (high capital and skill

intensity requirements, more specialised markets, etc.). Still, as already alluded to, this general anti-poor verdict overlooks the fact that, over time and space, some of these pro-rich rents trickle down to the poor, through indirect channels (e.g. employment, profit reinvestment and multiplier effects). Even when the poor are not the 'first-round' recipients of the rents, this does not necessarily mean that they don't benefit at all. In addition, some current trends, such as the increased local ownership of natural forests, could make certain timber sub-sectors more pro-poor in the future. Tree commercialisation for the growing markets for fibre, pulp or construction timbers can also help the poor, for example, through creating contractual arrangements between companies and smallholders. Finally, small scale wood processing in many areas provides a significant and growing level of employment.

Payment for the ecological services of forests is an emerging area with a high growth potential, but there are also uncertainties regarding how large and widespread such transfers will be—and to what degree poor people will be able to enter into these emerging markets. Payments for forest based biodiversity, tourism, hydrological protection and carbon-sink functions all have a vast global value and the increasing threats against them also enhance the users' willingness to pay to preserve them. However, the poor are often disadvantaged by their insecure land tenure and the transaction costs and risks that service buyers face in dealing with many smallholders or communities with internally divided interests.

As a result of our review, we have selected what we personally see as the ten most promising areas for future research. In our view, the highest priority themes are: (1) Natural forest products in household livelihoods (safety nets and increased welfare); (2) Small scale wood based processing enterprises; (3) Globalisation, trade liberalisation and markets; (4) Smallholder tree planting and private sector partnerships; and (5) Payments for forest environmental services. The second highest priority we assign to the following topics: (6) Economy wide benefits of forest based rents; (7) *On-site* ecological services; (8) Local resource control and land tenure; (9) Decentralisation, governance and market deregulation; and (10) Integrating forests into macroeconomic strategies.

Abstract

This paper provides a global review of the link from forests to poverty alleviation. Definitions are clarified and the key concepts and indicators related to livelihoods and poverty reduction and prevention are explored—distinguishing between the analysis (using broader welfare elements) and the measurement of poverty (using more tangible, traditional indicators). Reviewing the macro-level literature on the relationship between economic growth, inequality and poverty, we find that economic growth usually does trickle down to the poor and that poverty reduction without growth is in practice very difficult to achieve.

The potentials and limitations of forests in regard to poverty alleviation are canvassed and their possible roles as safety nets, poverty traps and pathways out of poverty are explored. A striking gap exists between, on the one hand, the current neglect of forests in many economic development and poverty reduction strategies and on the other, the high (and sometimes unrealistic) expectations regarding the role for forest products in parts of the forest literature. Both positions are critically evaluated. The core discussion addresses how forests can contribute to poverty reduction, distinguishing three main benefit categories. Firstly, non-timber forest products serve subsistence needs, may have important gap filling or safety net functions and sometimes provide regular cash income. Secondly, timber has not traditionally been very pro-poor but the current trends of increased local ownership of natural forests, growing tree commercialisation and small scale wood processing could modify that picture. Thirdly, ecological service payments are emerging rapidly but it is uncertain how much the poor will benefit. In conclusion, we outline ten promising research topics, within three broader fields: assessing current forest-based benefits to the poor; exploring emerging market opportunities; and evaluating cross-cutting institutional and extra-sectoral issues.

Keywords: Poverty Alleviation, Rural Livelihoods, Timber, Non-Timber Forest Products, Ecological Services

1. Forests and Poverty—a Controversial Link

The issues of poverty reduction and of deforestation/forest degradation both rank highly on the current international agenda. Attempts have been made to link the two together in a 'downward spiral'—poverty is seen as a cause of forest loss and forest loss contributes to maintain or even increase poverty. This implies that economic development and poverty reduction should help improve forest conditions and vice versa, that development of forest resources can be an important vehicle for poverty reduction.

This two way link has nonetheless, been questioned, with both causal directions having some empirical evidence going against them. Research findings tend to de-emphasise the importance and question the general validity of the link from poverty to resource degradation. The rural poor's resource management has strikingly variable effects upon forests and their management responses also vary in relation to marginal changes in welfare. The state of forests is actually as much threatened by wealth as by poverty. Hence, the belief that one could halt forest loss 'just' by bringing development to the South was probably partly based on wishful thinking (e.g. Angelsen 1997; Duraiappah 1996; Kaimowitz and Angelsen 1998; Scherr 2000).

This paper focuses on the link from forests to poverty. There are at least two reasons for this. Firstly, we probably know more about the link from poverty to forest loss than about this reverse link. Secondly, there is currently more international interest in the potential of forests to alleviate poverty than in poor people threatening tropical forests. For example, the Revised Forest Strategy of the World Bank, states explicitly that "the strategy must give priority to poverty reduction" (World Bank 2001). Also, among an increasing number of donors and national governments, reducing poverty has become the focal point for development interventions. In fact, the Poverty Reduction Strategies are becoming the key framework for projects and interventions in developing countries. The question therefore arises—what role can forests and forestry play in the efforts of developing countries to reduce poverty?

Prior to the analysis, a couple of definitions are required. Considerable confusion exists about

how to define and measure different adjustments to poverty over time. This can lead to cardinal errors in the logic about the potential of forestry interventions. For instance, let us assume that some poor people living in forest margins currently derive a high share of their income from their forests—say, 30% (subsistence and cash income combined). From this, observers often conclude that forestry interventions are a key to reducing poverty over time. However, that extrapolation, from a *static* observation to a *dynamic* approach, is flawed. In fact, a high dependence on certain forest products *may* in the first place, have been a cause of poverty. Or, more typically, high forest dependence *and* poverty reflect that other employment options that offer higher returns are not accessible to the poor.

Let us begin by clarifying our terminology. We use the term *poverty reduction* to describe a situation where people are becoming measurably better off over time, in absolute or relative terms. That is, people are being 'lifted out of poverty' when they climb above a pre-defined poverty line. In contrast, *poverty prevention* refers to the role of forests in helping people to maintain a minimum standard of living (even when it is below a given poverty line) and helping them to survive. We are thus comparing the present to a hypothetical situation where people would have less or no access to the forest resources they use today, a threat that is very real in many specific situations. Poverty prevention thus refers to insurance and safety net functions, it cushions or mitigates poverty without lifting people above the poverty line or even without making them better off over time. Finally, we use the term *poverty alleviation* as an inclusive term, encompassing both poverty reduction and poverty prevention.

We found that in the literature, the terms 'forests' and 'forestry' are not used consistently. In the following, we will refer to 'forests' in a way that is comparable to the definition of the Food and Agriculture Organization of the United Nations (FAO)—i.e. 10% crown cover, including both open woodlands and plantations. In some cases we refer to agroforestry and trees on farms but in principle, we count these activities as part of agriculture, not forestry—in spite of the fact that both can produce some of the same outputs as forests.

We interpret 'forestry' not only as industrial timber production but also more broadly, as any forest related primary production activity. This includes activities in sawmills or in charcoal production, while woodcarving and furniture making are examples of activities that we mention tangentially in the text but in principle, exclude from forestry proper. This is because most of the final value in the resulting commodities is normally added further downstream in the secondary processing stages, compared to the value that is generated in and near the forest. Yet, as discussed later, there are very important 'forward linkages' and 'multiplier effects' in these downstream activities.

Several other recent publications by CIFOR and its associated researchers also deal with the forest-poverty link. Hence, this paper serves to complement the existing body of CIFOR's work on poverty and forests. Arnold (2001) focuses particularly on the poverty alleviation role of forestry aid. Wunder (2001) limits his discussion of poverty reduction potentials to *natural* forests (excluding tree planting) and their *products* (excluding forest services) but also deals with the reverse link, from poverty to forest condition. Byron and Arnold (1999) disaggregate the term 'forest-dependent people' into more functional socioeconomic sub-groups, which we will refer to later. Neumann and Hirsch (2000) review the poverty alleviation potentials of Non-Timber Forest Products (NTFPs), while Arnold *et al.* (2003) look specifically at fuelwood.

A joint report by Forest Trends and CIFOR (Scherr *et al.* 2001) provides a comprehensive review of markets for forest products, while Smith and Scherr (2002) assess the opportunities for selling forest carbon under the Clean Development Mechanism (CDM), to improve local livelihoods. Kaimowitz (2002) provides an overview and discussion of the forest benefits to rural livelihoods in Africa and Sunderlin *et al.* (2003), in a Chapter on Forests and Poverty in FAO's "State of the World's Forests 2003" report, present a brief synopsis of all the above mentioned topics.

While clearly overlapping with most of these issues, the present document takes a slightly different angle. Firstly, we step back for a moment to look at the implications of different *key concepts* related to livelihoods and to poverty and its alleviation. Secondly, we integrate into the discussion both products from *planted* forests and trees and the emerging payments for *forest services*. Thirdly, we discuss forests in the light of general economic theories about the nature of poverty. In addition, we point to strategic implications for forest research organisations. Finally, we also discuss some of the ongoing political processes in this field, such as the World Bank's new Forest Strategy paper (World Bank

2001) and FAO's policy brief on how forests can be made more pro-poor (FAO 2001)[1] and we look at the role of forests in Poverty Reduction Strategies (Oksanen and Mersmann 2002). The first two documents signal significant shifts in the positions assumed by two major actors in the international forest development arena, although the latter shows there is still some way to go in terms of implementing the changes in national policies.

This paper will not deliver a ready made menu of actions for forest led poverty alleviation. We are not able to provide definitive guidelines as to which baskets should receive how many eggs, so to speak. Yet, from the available evidence and according to common sense, some baskets certainly appear more promising than others. Moreover, the choices regarding both poverty and forest concepts and indicators have important implications for the basket selection. With this paper, we aim to make the assumptions behind these choices more transparent.

There is a striking gap between on the one hand, the almost complete neglect of forests in economic development and poverty reduction strategies and on the other, the expected role for forest products in parts of the forest literature and in the writings on NTFPs in particular. We intend to critically discuss both positions. Empirically, too little is known about the potentials and currently, both neglect and unrealistic expectations coexist. Forests have both potentials and limitations in regard to poverty alleviation (i.e. reduction and prevention).

We acknowledge that there is an inherent problem in global reviews such as this one. When discussing the whole developing world at the same time, few permissible generalisations exist and almost every opinion is valid somewhere. The poor, even the so called 'poorest of the poor', tend to be a very heterogeneous group and exhibit a range of quite different interactions with forest resources. Hence, proposals for intervention must be context specific, providing reference to particular forests and socioeconomic and political conditions. The welfare status alone of people living in and near forests tends to say little about their interaction with forest assets. Nevertheless, the poor do have some characteristics in common—which served to make them poor in the first place: a shortage of assets or capital (see section 2.2) and limited opportunities in the labour market, etc.

This document is structured as follows. Section 2 presents different definitions of poverty and discusses their applicability for studying interactions with forests. Section 3 provides a few insights from a long standing development debate on the links between economic growth, inequality and poverty reduction. These sections form the basis for the core discussion in Section 4 on how forests can contribute to poverty reduction within three different fields: NTFPs, timber and environmental services. Section 5 poses some research questions and suggests promising topics. The appendix deals with some strategic issues for future poverty research specifically at CIFOR but this will also be of interest to other institutions conducting research within this field. In a slightly more provocative tone, we also put forward the pros and cons *vis-à-vis* a series of strategic research choices.

2. Defining Poverty in a Research Context

2.1 The traditional concept

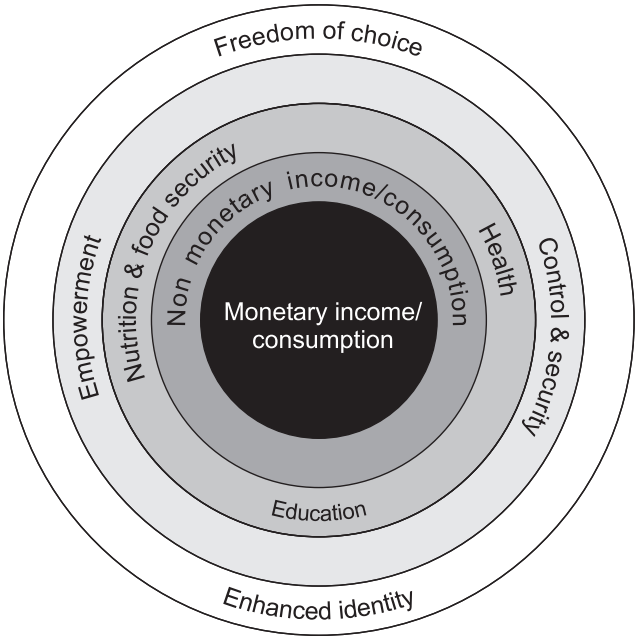
Concepts at the centre of international debates often face pressures for a broadened interpretation. While adjustment of concepts over time may be desirable, they also generally tend to become increasingly embracing and inclusive and therefore face a real risk of overloading and 'concept degradation'. Certainly, the term 'poverty' is no exception. The traditional definition of poverty has focused on income and wealth—for example, as defined in Webster's dictionary as: "The lack or relative lack of money or material possessions" (Webster 1993). This materialistic definition from classical economists like Adam Smith and David Ricardo dominated until the post WWII period.

In recent decades however, it has become increasingly popular to extend the definition of poverty to other, non-material aspects of human well-being. Indeed, the evolution of the concept of poverty reflects changes in development theories generally and the analysis of the causes of poverty specifically. The attempts at *measurement, description* and *analysis* of poverty have expanded accordingly.

Figure 1 illustrates possible dimensions of poverty and how the perception of these elements has evolved over time. The inner core of the circle shows *monetary* income or consumption, at different levels of aggregation (e.g. from household surveys or national income statistics). During the post-WWII period and

up until the 1960s, the policy focus was more or less exclusively on expanding monetary income. The accumulation of man made (physical) capital, through savings or aid, was perceived to be the key to achieving economic growth, which would then 'trickle down' and benefit the poor. Growth and poverty reduction would not always coincide perfectly but ultimately they would go hand in hand.

Figure 1. The Poverty—Well-Being Interface



The second layer refers to *non-monetary* income and consumption—the 'hidden harvest' of subsistence goods that do not enter the formal cash based economy. In market-remote areas, these may be more important for the household economy than cash income. Forest products frequently contribute more to poor households' non-monetary rather than monetary income. The second layer represents no fundamental shift in the poverty definition but points to the critical importance of including goods not entering the marketplace.

2.2 Extending the poverty concept

During the 1970s, the emphasis in the development debate gradually shifted from hardcore economics towards the 'basic needs' of poor target groups. This accompanied changes in the measurement of welfare. The poverty concept was subjected to what one might call a 'human development extension' of the poverty term, implying that increasing attention was given to indicators related to health, education and nutrition (see third layer in Figure 1). The most popular indicator has been the Human Development Index (HDI) published annually by UNDP. HDI includes per capita income but with decreasing welfare 'returns' over growing income levels—an extra dollar in a poor country has a greater HDI effect than in a rich one. In addition, health (with life expectancy as the indicator) and education (with literacy and school enrolment indicators) are incorporated into the index.

In regard to forest dwelling people, the HDI adds some valuable dimensions, compared to a pure income measure. People living in remote areas with abundant forest resources sometimes have good access to food consumption or even relatively high cash incomes. However, low government service levels at the forest frontier mean that they lag behind in terms of health and education indicators.

Nevertheless, one could still argue that the choice of the particular HDI indicators as well as the weighting among the three indicators (income, education and health) remains arbitrary (Ravallion 1997). Attempts have thus been made to increase the number of poverty indicators and make the selection process more transparent—although this greater sophistication and complexity comes at the cost of a less intuitive interpretation (see Section 2.4).

Opposition against the belief that economic growth automatically takes care of all human needs also came from the environmentalist corner, notably with works such as "Limits to Growth" (Meadows *et al.* 1972). Again, this had implications for the poverty concept as well. During the 1970s and 1980s, emphasis gradually shifted from physical, man-made capital to *human* and *natural* capital as the foundation for welfare improvements. This also provided a basis for integrating natural resource management in general and forests in particular, into the discussion about basic needs and poverty alleviation. The third layer in Figure 1 illustrates this shift.

Over the last decade, we have witnessed what one could call an *empowerment and institutional extension* of the poverty concept—the fourth layer in Figure 1. Some of the catchwords have been 'decentralisation', 'devolution' and 'governance'. One of the underlying reasons for this change was a growing recognition that these power related factors are

It can be useful to think *about poverty in broader welfare terms, using a range of indicators of well-being (like health, education and nutrition) but to still* measure *it using more tangible, traditional indicators, closer to the original meaning of the term. Ghanaian immigrants in a village on the central Ivory Coast, in search of improved well-being.* (Photo by Carol J.P. Colfer)

welfare creating in their own right (e.g. it is more satisfactory for people to live in a society with democratic rights). Additionally, they were assumed to have a positive impact on the creation of material benefits, cf. the debate on whether democratic institutions enhance economic growth, e.g. Rodrick (2000). Empowerment is thus both a means and an end.

The Sustainable Livelihoods Approach (SLA)

A widely applied concept, originally developed from work at, *inter alia*, the British Institute for Development Studies (IDS), is the Sustainable Livelihoods Approach (SLA). This approach was made the cornerstone of the poverty reduction strategy of the Department for International Development (DFID) in the United Kingdom (Carney 1998). The SLA has also been applied to the management of forest resources (Warner 2000; Shepherd *et al.* 1999). "A livelihood comprises the capabilities, assets and activities required for a means of living" (Warner 2000). This draws on the 'actor-centred' perspective on poverty of Chambers and Conway (1992).

The idea is basically that development practitioners should look at *all* the factors that matter for poor people in their daily lives. Only such a holistic assessment would be able to "build on the positives which people already have in their grasp" (Carney 1998) and thus fully reflect existing options for poverty reduction. In terms of identifying constraining capital types, the institutional focus is summarised in what has been termed *social capital*. At the same time, social capital also has an important link to environmental factors (e.g. Pretty and Ward 2001), adding to the relevance of forests.

The SLA is closely linked to what has been termed the 'five-capital approach', cf. Scoones (1998), Carney (1998) and Bebbington (1999). *Natural, human, social, physical* and *financial* capital represent the main asset categories. However, Bebbington (1999) substitutes 'cultural' for financial capital as the fifth asset type for his analysis of Andean peasants, thus stretching the concept further away from the materialistic interpretation. Baumann (2000) further adds to the conceptual complexity by developing a new five-capital version with 'political' capital as one of the assets.

Bebbington (1999) discusses how the livelihood outcomes of different households are determined by their access to capital endowments and processes of *capital use, transformation and reproduction*. Similarly,

Carney (1998) presents a framework in which assets are transformed into *livelihood outcomes* through a set of *transforming structures and processes*. Her livelihood outcomes include income, well-being, vulnerability, food security and sustainable use of natural resources.

Recently, *institutions* have been emphasised more as an independent factor in the SLA concept, although there is a clear overlap here with 'social capital'. Nobel Laureate Amartya Sen has greatly influenced the empowerment and institutional extension. In his work (including his recent book, "Development as Freedom"), Sen outlines a broadened concept of poverty as a 'capability deprivation'. Poverty reducing development is thus viewed as a process of *greater freedom of choice*, in a multidimensional way (Sen 2001). Both of these possible extensions are expressed in the outer circle of Figure 1.

Much of the discussion about these concepts depends on how one chooses to define poverty along several related dimensions:

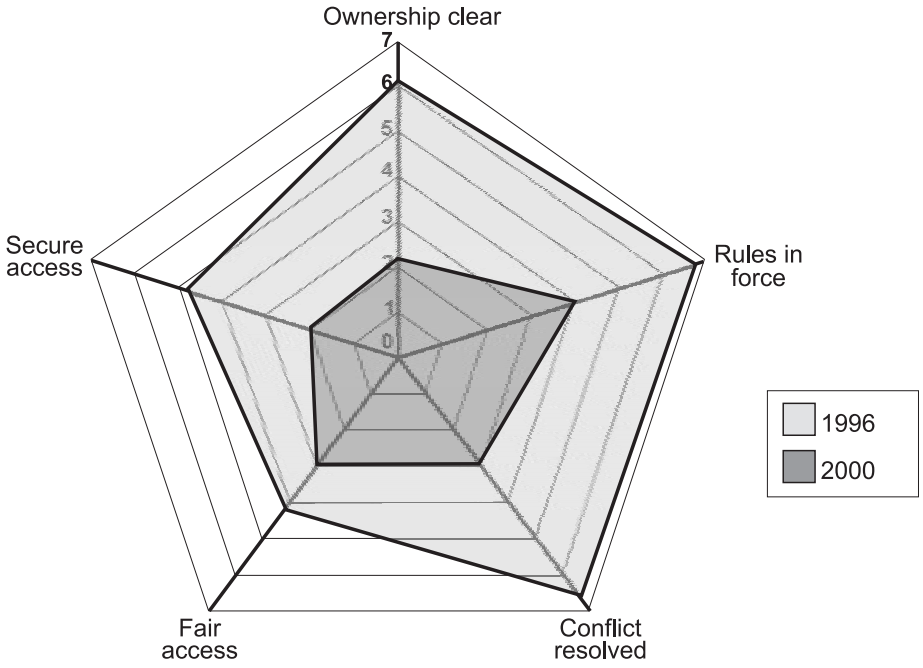
- flows *vs*. stocks
- ends *vs*. means
- outputs *vs*. inputs
- outcomes *vs*. processes

For example, are people defined as poor because of their limited income or also because of their limited assets (which are used to generate income)? We lean more towards a 'flow' or 'outcome' oriented definition, where assets are a means to create welfare. This would imply that assets or capital are normally not ends in themselves.

Figure 2 shows an applied example of the five-capital approach from CIFOR's work in Bulungan Research Forest, Kalimantan, Indonesia. In this case, CIFOR researchers disaggregated the social capital category into five quantitative sub-groupings: ownership, security, access, conflict resolution and rule enforcement. The situation in the year 2000 (represented by the inner 'spider web') is then compared to that of 1996 (the outer one). As the 2000 representation (with less security, access and ownership and with the other endowments being unchanged) is fully contained within the 'web' for 1996, it can be concluded that social capital has unambiguously declined during the period under analysis.

The five-capital approach uses this kind of analysis to illustrate changing endowments of natural, financial, human, social and cultural capital. However, it also has several problems as a comparative poverty descriptor. First of all, this tool cannot evaluate the phenomenon of 'overlapping spider webs'—that is, of some capital types increasing while others decrease. And unfortunately, this is precisely what tends

Figure 2. Decomposing Social Capital from a 'Five-Capital' Perspective



An example from CIFOR research in Bulungan, East Kalimantan, Indonesia

to happen in a society during 'development'. Structural changes occur, for example, when people in forested areas reduce their natural capital (e.g. selling a tree) to acquire more financial capital (e.g. accumulating savings), physical capital (e.g. buying a small truck) or human capital (e.g. paying for children's school fees).

The five-capital approach basically 'compares peaches to oranges' and does not in or of itself, provide tools to evaluate whether capital substitutions make people better or worse off. Of course, that may adequately reflect the fact that human welfare is multidimensional. As an analogy, we don't live by peaches alone but also by oranges and other fruits. Yet as long as there is no equivalency standard between these various 'fruits', the five-capital approach cannot tell us anything about the comparative desirability of situations—except for the highly exceptional situation where, as in Figure 2, all types of capital move parallel in the same direction over time.

A second observation is that normally, one cannot live on capital itself. It has to be used and transformed in productive ways to create welfare. A change in stock endowments alone can give a highly misleading picture. For instance, settlers in a forest abundant area may under-utilise their large stock of natural capital. Therefore, we can often observe that they are eager to trade a good share of their forest for what outsiders perceive to be a negligible increment in financial capital. This is because in many cases, the latter constitutes a greater constraint on welfare improvements than the former. Eventually, problems of undesirable capital composition and uneven capital productivity lead us back to income, consumption or other indexed variables related to the welfare *outcome*, rather than the capital inputs producing it (see below).

Thirdly, the definition of 'capital', like 'poverty', is originally an economic term. One might legitimately question whether it is being stretched to an extreme where it now makes little sense. We believe 'cultural capital' and 'political capital' should be avoided as scientific terms and social capital is a debatable, borderline case.[2] This verdict in no way denies that social organisation (e.g. local institutions effectively managing forests) and cultural processes (e.g. indigenous knowledge about forest uses) contribute positively to production and welfare. But so do many other things that we do not label as 'capital', like 'labour' or 'technological progress'. There is no 'accumulation of goods' nor clear cut 'investment strategies' allowing people to actively increase the reiteration of these processes. We should perhaps recognise that not everything that matters for production and welfare is a 'capital', nor is it easily accountable in economic terms more broadly.

Based on these three arguments, we conclude that the five-capital approach is instructive in pointing out the multidimensionality of human welfare and of the processes generating this welfare. It can be a conceptual tool at the level of grasping an overview of a series of livelihood changes along different dimensions. However, it cannot be used for the measurement of poverty. Hence, it is also unsuitable in specific case studies for making overall comparative judgements about the desirability of change processes.

In summing up the points raised in this section, the trends over the past three decades can be represented by a move from the inner materialist core towards the outer human well-being periphery illustrated in Figure 1. More specifically, this means going:

- from a reductionist one-dimensional index to a vector with multiple indicators,
- from (intended) objective measures to (consciously) subjective ones or
- from an economistic 'top-down' approach to a holistic 'participatory' one,
- from a pure outcome measure to a causality-inclusive indicator and
- from materialistic to 'soft' assets (capitals) with decreasing tangibility, measurability and comparability.

The World Bank's three-dimensional concept of poverty

The World Bank and other international agencies have also responded to the demands for a broader poverty definition but have taken a different route compared to the SLA approach. The three-dimensional poverty definition used by the World Bank (2000) maintains a focus on the materialistic core but also tries to be more encompassing and inclusive. The three dimensions included in this definition are:

(1) ***Opportunity***—this includes *income*, *education* and *health* as measures of well-being. This component is therefore similar to UNDP's Human Development Index.

(2) ***Security***—this refers to the risk of experiencing periods of shortfall in income (below a poverty line) or other welfare indicators. Vulnerability is a function of both the probability and size of an income (or health) shock and the ability to cope with such shocks in terms of safety nets, alternative income sources, insurance mechanisms, etc.

(3) ***Empowerment***—this covers access and control over local resources, public services, influence in local decision making and so on. As pointed out by Sen (2001), power can be seen both as an end in its own right and as a means to create opportunities.

This three-dimensional concept is an attractive representation of the poverty concept. Note again though, that normally only the first dimension (opportunity) is measurable, while the second may be but only under certain circumstances. The concept thus has important qualitative elements that one should keep in mind but which do not lend themselves to quantitative comparisons.

Difficulties in measuring and comparing the 'security' and 'empowerment' dimensions are also obvious from the World Bank's own use of the poverty term (World Bank 2000).[3] When referring to poverty reduction in other publications, it is almost exclusively reduction in income poverty ('a dollar a day'). One argument for using an apparently narrow income or consumption based definition of poverty is that, in the long run and at an aggregated scale, economic growth and poverty reduction (in terms of the income, health, life expectancy, education, vulnerability and political influence of the poor) often go hand in hand (Ray 1998; World Bank 2000).

However, there are important exceptions to that national development pattern. In some cases, such as in Cuba, Sri Lanka or Kerala state in India, long term improvements in education and health were achieved in spite of a relatively stagnant monetary income. Conversely, research by the International Food Policy Research Institute (IFPRI) has shown that higher income does not automatically improve nutrition levels (M. Zeller, pers. e-comm., 18 Feb 2002). At the sub-national level, many regions that are rich in forest products and become integrated with markets may also register an abundant cash flow while social services consistently lag behind. We will return to these issues in Section 3.

2.3 Poverty and subjective well-being

Regarding the poverty of people living in and near forests, an essential distinction is between on the one hand, people's own subjective perceptions of well-being and on the other, the attempts of others (e.g. researchers or statisticians) to objectively form their conclusions based on externally defined, standardised indices of welfare. There has been growing interest in the first kind of assessment, for example, as illustrated in the work of the International Center for Tropical Agriculture (CIAT) (CIAT 1999; Ravnborg 2002) and the World Bank's large 'Voices of the Poor' study (Narayan *et al.* 2000). Yet, not much literature has dealt explicitly with the relation between the two types of measures. Is it best to simply ask people whether they view themselves as poor and why, or should one come in with pre-defined concepts? One might argue on philosophical grounds that only the individual's own judgement matters—'you are poor if you feel poor'. Further, as a research strategy, the subjective approach is valuable. What matters are people's own perceptions and preferences and an aim of research is to assist people in fulfilling their aspirations. This section will examine the pros and cons of this approach.

There is a large body of literature from developed countries on income and subjective well-being (SWB), which sheds light on this issue, as summarised by Offer (2000). SWB is usually measured by survey interviews on different indicators, where individuals state their degree of 'happiness' and satisfaction with living conditions. In most developed countries, a cross-section pattern of 'decreasing welfare returns to income' was found:

- At low personal income levels, SWB rises more or less proportionally to income.
- At higher income levels, SWB returns to additional income diminish and variance increases (i.e. non-income factors influence SWB more).

These characteristics of the relationship between income and welfare are rather robust—they hold with regard both to different countries and different SWB indicators. However, these generalisations are much less valid for time-series analyses. Repeat studies in three developed countries (France, Japan and the United States) after WWII—a period of steady income growth for all three countries—show that the proportion of the population stating it was happy had not increased significantly in any of

the three countries. Actually, differences *among* countries are more accentuated than in-country changes over time.

This finding might support those who claim that 'money does not make you happy', but that would be an over-simplification. Those who 'can't keep up with the Joneses', that is, who fall significantly behind the norm of (gradually rising) material living standards, generally have a low SWB. In developed countries, the share of people satisfied with their living conditions is generally in the high range of 65-85%. So, what things make them express dissatisfaction, i.e. a low SWB? In developed societies with elevated income levels, the following deviations from the 'standard norm' are associated with feeling unhappy: unemployment, low educational levels, low income (relative to the median and irrespective of the absolute level) and belonging to an ethnic minority.[4] As indicated above, there are also differences among countries, with some cultures (e.g. Japan and Southern Europe) expressing themselves on average, to be less happy than others (e.g. Scandinavia). This is in spite of the North of Europe showing a significantly higher incidence of suicides than the South.

One general lesson from this dominant pattern in developed countries is that absolute income is very important for the well-being of the poorest segments of the population, although some poor egalitarian societies can also be negatively affected by 'unequalising growth'. As income increases, SWB generally becomes more linked to factors of equality and relative position in society, which include many non-income factors. Another point is that stated SWB gives a poor reflection of welfare in a comparative setting. There seem to be no objective reasons why Scandinavians should be continuously much happier than the Spaniards or Italians. Being Scandinavians ourselves, we rather suspect that in some cultures, it is much more acceptable to openly express dissatisfaction than in others.[5]

What do these findings mean for forest dwelling people in poor countries? Indicators of subjective well-being have still not been tested sufficiently in developing countries to allow for comment on the extent to which they are useful for applied policy research (M. Zeller, pers. e-comm., 18 Feb 2002). For the measurement of SWB at a single site, qualitative survey methods may provide a good reflection. However, we know from our own fieldwork that culturally biased and strategic responses will often make it difficult to evaluate the results. Comparative SWB studies would thus face even larger problems, as the poverty standards and causal factors are likely to differ greatly across locations.

Participatory Poverty Assessment (PPA) is an attempt to empirically quantify and aggregate SWB. For instance, the use of PPA in Uganda illustrated that income growth is not necessarily increasing SWB. Uganda enjoyed the highest rate of economic growth in Africa during the 1990s and surveys also demonstrated that household consumption had been increasing. Nevertheless, the PPA highlighted poor people's perceptions of deteriorating well-being over that same period. Kanbur (2001) discusses further, using examples from Ghana in the 1980s, how such divergence in poverty measures can arise: growth is unequally shared with some groups falling behind (at least in relative terms) and experiencing a deterioration of public services.

However, the PPA methodology has also been criticised. Ruggeri-Laderchi (2001) finds much evidence of 'cosmetic' participatory components in her review. Even the most authentic techniques have elements of arbitrariness—a complex reality has to be structured and information is simplified, which introduces subjectivity. Moreover, proponents of participatory methods make the debatable assumption that the poor can actually articulate and analyse their own reality, even in rapidly changing environments.

If income and 'development' indicators give a poor reflection of SWB for poor forest dwellers, is it preferable then to work with a predetermined selection of qualitative indicators? It might be in some cases, but this approach does open up to the possibility of arbitrariness and the biased selection of indicators. An illustrative example was given at the 'Poverty and Biodiversity' workshop of the 15th Global Biodiversity Forum (GBF), held in May 2000, in Nairobi (which one of us participated in). A representative of a South American conservation NGO had analysed the social and environmental consequences of a new road being constructed near a village in a heavily forested area. Not only was much of the forest destroyed, poverty had also increased, according to all of the five qualitative indices that had been chosen after initial consultation with village members. That is, local self determination had declined, cultural identity had been compromised, environmental quality was reduced, inequality had risen and the village was

exposed to higher risks. There was hence an unambiguous increase in poverty and according to the presentation it was obvious that biodiversity destruction went hand in hand with diminished human well-being.

Nevertheless, taking a step back, one wonders what happened in the same village to all the factors in the 'materialist core' of Figure 1 (i.e. to the options for commercialising products, to local income generation and the community's access to health and education services, etc). These are precisely the factors that often make remote communities opt strongly in favour of road construction. This example shows that the choice of a few qualitative indicators can ultimately imply a serious risk of linking up to poverty concepts that, in the worst but probably not too rare case, are normatively tailored to fit a specific and external agenda, rather than representing local people's own priorities.

To summarise, the key argument for using SWB is that, at the end of the day, what matters is one's own (subjective) assessment of well-being. Only people themselves can judge their own welfare, with their own set of indicators. The main limitations of this approach are strategic biases and the difficulty of comparisons, particularly cross-sectional ones. Cultures and 'thresholds of happiness' differ. The subjective nature of the question represents a significant problem for the data collection. For instance, some people might not want to reveal that they are unhappy to 'save face', while others want to exaggerate their poverty out of a strategic desire to increase the likelihood of development assistance.

2.4 Concepts and indicators: what to choose and how to measure?

We will now summarise the discussion from this section and make recommendations for applied analysis regarding four essential areas:

(1) The multi-dimensional use of the poverty concept (measurement *vs.* causal analysis)
(2) Variable degrees of poverty (the 'poorest of the poor' *vs.* the moderately poor)
(3) Absolute *vs.* relative poverty (basic needs vs. inequality)
(4) Subjective *vs.* objective poverty measures

2.4.1. Analysis vs. measurement of poverty

The above discussion suggests that one ought to distinguish between the *conceptual analysis* and the *measurement* of poverty. Poverty contains an important quantitative dimension. A key criterion for a *poverty measurement indicator* is hence to allow for a consistent distinction between the poor, the not so poor and the non-poor. Income (monetary and non-monetary) and consumption are still key concepts in this respect, while SWB and livelihood indicators are poorly suited for the job, especially for comparative purposes. On the other hand, the sustainable livelihoods and five-capital approaches can help us to better understand the *causes* of poverty related processes, especially at individual sites. In this way, the scope and focus of research will also influence the choice of indicator.

The trend over time to use more inclusive measures reflects new research about the causes of poverty, proposed solutions, political trends and pressure from NGOs and others to broaden previously narrow definitions. With poverty back on the international agenda, donors might also be using poverty alleviation as a shorthand notation for several development objectives (health, education, equality, equity, economic growth and empowerment) in the same diffuse way as 'sustainable development' was/is used. The term might become too all encompassing and therefore eventually too vague to be useful for analytical and practical purposes.

In a philosophical discussion of the poverty concept, one would like to include both its multi-dimensionality and its subjective character. In practical work and in measuring poverty, however, one has to make several simplifying assumptions. Ravallion (1997) notes the great divergence between on the one hand, the comprehensive definitions of poverty found in the recent literature and on the other, what it is possible to operationalise and measure on the ground—both in terms of methods and data availability.

Income is just one option to condense 'peaches and oranges' into a single *numeraire* index. Obviously, subjectivity also enters into income based analysis, for example, in the choice of goods and services entering the basket of minimum consumption. Strategic responses may apply in consumption as well and in income surveys in particular. Producing good household income surveys is a relatively expensive exercise

and takes time. Income comparisons across countries using exchange rates are complicated by variations in purchasing power capabilities, although economists remedy this by using Purchasing Power Parities (PPP).

A good complement to both subjective perceptions and externally based indicators may be found in other diagnostic measures of poverty (e.g. visual assessments of malnutrition, birth weight, housing, education levels and other observable indicators). These can be used to corroborate or refute claims of severe deprivation (W. Sunderlin, pers. e-comm., 10 Jan 2002). Recent work at the International Food Policy Research Institute (IFPRI) has attempted to use quantitative methods to synthesise these measures into a single index of relative poverty (Zeller *et al.* 2001). More than 200 simple, interview based poverty indicators were screened. These included both quantitative and qualitative factors and also incorporated direct welfare measures, subjective well-being factors and assets that were assumed to produce welfare (e.g. of the five-capital type). Principal Component Analysis was used in each case to select 10-20 indicators for the construction of an index, as an alternative to income comparisons, thus also leaving space for local-specific indicators.

This type of index is flexible, less arbitrary and more comprehensive than an income measure. However, combining such a large number of (absolute and relative) indicators in a fully empirically driven selection procedure can make it difficult to interpret the results. In other words, alternative measures can be very useful but income still has a role to play. It is an indicator that has been thoroughly tested (for the monetary part within the market place), that has well known pros and cons and more appeal to policy makers than the ranking of an abstract index.

For research purposes, it may be convenient to *think* about poverty in terms of the livelihoods approach or the three-dimensional method sketched by the World Bank but at the same time, to *measure* the material indicators that are closer to the original meaning of the term 'poverty'. This would mean that measurement should be done by income, the value of consumption or other multi-factor indices taking into account human development dimensions.[6] Ultimately, the choice of indicator in a specific project should depend on research objectives, budget, duration and the need for comparisons across sites. For a broadened approach including non-quantifiable poverty causes, it is often better to talk explicitly about 'poverty *and* human well being', rather than overloading (and ultimately devaluing) the term 'poverty'.

2.4.2 Degree of poverty

In our context, it is important to distinguish between the (moderately) poor and the very poor. The poorest of the rural poor (e.g. landless labourers) frequently have a fundamentally different relation to the forest resource than the moderately poor (e.g. a smallholder) (Byron and Arnold 1999). Separating the extremely poor from the moderately poor, whether by consumption based or other indicators, is important for the targeting of poverty programmes. While many forestry projects and programmes have been successful in reaching the moderately poor, there has been some concern that they seldom reach the poorest group. As stated by a senior forestry official from a bilateral aid agency during FAO's poverty forum in September 2001, "Forestry is probably not a good tool to reach the poorest of the poor".

There are several distinctions to be made. In some cases, the moderately poor are in a better position to take advantage of those forestry opportunities that require a minimum level of education or other assets. Many of the poorest, landless groups use the forest resource in a degrading way (e.g. charcoal makers - see section 4.2.3) as they have no self-interest and incentive to conserve it. Other groups, like some of the poorest and more isolated indigenous ones, are more dependent on the conservation of forests (though not necessarily on conventional *forestry*) for their welfare than moderately poor squatters or settlers are.

'Forestry' in the narrower sense of the word has been less successful in reducing extreme poverty than say, small scale agriculture or labour intensive manufacturing. Targeted forestry programmes might sometimes achieve that purpose but even these have shown mixed results. Impact oriented forestry research aiming to make a difference in terms of poverty reduction is thus more likely to succeed if it includes the moderately poor than if it, from the outset, is exclusively targeted at the poorest of the poor. The issue of target groups is discussed further in the Appendix.

2.4.3 Absolute vs. relative poverty

Absolute poverty is defined in terms of the satisfaction of basic needs. It can be measured for instance, in terms of the amount of people living below a time-invariant poverty line defined by income, consumption or nutrition. In contrast, *relative poverty* implies a ranking with respect to a particular poverty indicator, be that income, consumption, land area or subjective well-being. Notably, this implies that economic growth and other progress in absolute welfare indicators reduce absolute poverty just as long as the poor receive some benefits, even when other income groups benefit more from that progress. On the other hand, relative poverty would increase in this situation, as the share of the poor in total welfare would decline. They would become more disadvantaged in comparison to the better off income strata (e.g. Fields 1980 and Section 3).

How relevant are the two types of measures for subjective welfare at different income scales? In the economic history of *developed* countries, absolute income increases have proven to be most welfare improving at low income levels, while relative measures gain importance at higher income levels (see above). The very poor care more about their basic needs, for example, getting more and better food on their table. However, as they become slightly better off, they increasingly have an eye on their neighbour's table. If the servings are growing faster on the table next door, they start to feel poorer for failing to 'keep up with the Joneses', even though their individual basic needs fulfilment may have actually improved.

Is this also a correct characterisation of poor forest dwelling people? Do the poorest of them care more about absolute income and basic needs, while the moderately poor start to compare their living standards with the people around them? Arguments can be raised for and against but this would probably be a wrong generalisation. From CIFOR's work in East Kalimantan, as elsewhere, there are examples of income poor but fairly egalitarian societies where relative income is highly relevant for people's welfare. Typically, the horizon of remote forest dwellers changes when they increase their contact with the market economy and their material consumption options are enhanced. The 'keeping up with the Joneses' phenomenon is thus also present in poor societies, more than many Westerners who focus on basic needs as being the sole key to improving the lot of the most disadvantaged, would believe. It may be considered more important to buy a television like their neighbour's than to improve their basic diet or fix their roof. Subsistence levels are often defined in nutritional terms but what is considered a 'minimum consumption requirement' also has strong cultural and social roots. This emphasises a relative poverty dimension, sometimes labelled the 'social contingency of wants' (Brekke and Howarth 2000).

What about the relative dimensions of non-income factors, such as 'security' and 'empowerment'? The security dimension is an absolute concept, related primarily to basic needs. The power dimension is, by definition, a relative measure. To give more power to poor people implies necessarily a redistribution of power from other agents. However, sometimes the term empowerment is also employed more broadly in ways that involve capacity building, which does not necessarily imply a zero-sum game.

2.4.4 Subjective vs. objective poverty measures

A subjective assessment of poverty would seemingly imply that we accept our target group's preferences and "let people themselves decide" to what extent and in what respects they are 'poor'. At first sight, this looks like an honourable and irresistibly participatory principle but it can have some unpleasant implications. Firstly, different 'filters' and strategic behaviours often make people conceal their true poverty situation and preferences to outsiders. Secondly, local poverty perceptions may differ dramatically, even *vis-à-vis* those stated in the neighbouring village. This will jeopardise any type of comparative poverty assessment.

Thirdly, the subjective short term preferences of local people may be neither consistent with their goals of long term welfare improvement, nor coincide with external values. Many researchers feel uneasy, for example, when observing that cigarettes are the single biggest cash expenditure item in rural households. Sudden large cash inflows can reduce poverty (in terms of materialist constraints) but can also lead to social disruptions related to alcohol consumption, prostitution and luxury items for short lived benefits, especially when these monetary incomes are solely appropriated by males. This ultimately raises difficult questions about how preferences and perceptions about 'the good life' are formed—and who is to judge.

In such a situation, it may be preferable to state that "poverty was reduced" and that "other welfare measures declined". At the micro scale, reduced poverty (in terms of income) does not always automatically result in increased human well-being.

2.4.5 Forest definitions and poverty relevance

Finally, it is not only the choices of poverty definition and indicators that matter. The selection of forest and forest product definitions will also have a bearing on the poverty relevance of forest research and action. At one extreme, if a very narrow definition is used, where only primary or ecologically intact tree vegetation is counted as forest, its relevance for poverty reduction on a grand scale will be limited. On the other hand, if the forest definition is made so broad that it includes plantations, areas that are fragmented or degraded and even trees outside forests ('forests and trees'), then the poverty relevance tends to increase. This is because more people usually live in and around disturbed and converted ecosystems, with higher intensity of use and average (per hectare) returns. This matter has become more important especially in forest-poor environments: "Many 'forest' products are no longer drawn from forests" (Arnold and Townson 1998).

Confusion about the natural origin of products and incomes can also come to exaggerate claims about the economic importance of forests, which would ultimately misguide land use decisions. For instance, one often sees household incomes derived from 'wildlands' (including woodlands, savannahs and grasslands) generally referred to as 'forest incomes'. The renowned study by Cavendish (1997) on drylands in Zimbabwe is often cited for an average per household *forest* income share of 35% but that portion actually refers to what the author calls 'environmental resources', including not only non-forest wildlands but also certain agricultural and mining outputs. Excluding the latter but still including the value of livestock grazing in the woodlands category, the income contribution shrinks to 20%.[7] In other words, care is needed in defining explicitly what resources are included—and in referring to the results of others in a correct manner.

For poor rural villagers, forest products can serve as safety nets in times of need. Forest dwelling family in Cameroon, Africa. (Photo by Edmond Dounias)

3. Causes of Poverty

Discussions on how forests can contribute to reducing poverty are often based on vague implicit assumptions about the more fundamental causes of poverty and conversely, about the sources of reduced poverty. As indicated by Adam Smith's classic "The Wealth of Nations", published in 1776, this topic has been central to social science for centuries. In this section, we will refer to recent empirical work on economic growth, poverty and inequality. The purpose is to bring on board some basic lessons from the economic development debate—lessons which despite their undeniable relevance, are often ignored when arguments and claims about *forest(ry) based* development are made.

3.1 Poverty and growth

Historically, two major positions stand out as extremes in the discussion about the causes of poverty:

(1) The *developmentalist* position explains poverty in terms of lack of economic advancement, normally equated with insufficient economic growth.

(2) The *class-based* (Marxian inspired) theories view poverty as a result of uneven development and exploitation, resulting in skewed asset and income distribution.

According to the first view, the problem is that the cake is too small, while the second suggests the cake has been cut unevenly. While the first view regards poverty to be an *efficiency* or *growth* problem, the second sees it as a *distributional* one.

The two views produce fundamentally different predictions about whether economic growth and structural change help to reduce poverty or not. The ultimate Marxian view would hold that: "In countries at low levels of development, any kind of structural change such as industrialization or expanded commercialisation tends to increase poverty among the poorest members of the population" (Adelman and Morris 1978). However, much empirical work over the last decade, facilitated to a great extent by better income and consumption data at different levels of aggregation, has enlightened this debate. At present, there is a growing consensus (e.g. Fields 2001; Ravallion 2001) that:

(1) In most cases, macroeconomic growth actually raises the income of the poor and reduces the number of people below the poverty line. Growth 'trickles down'—at least in the medium and long term and at an aggregated (national) scale.

(2) In a minority of deviating cases, little or no poverty reduction is achieved through growth because of a skewed initial asset distribution and/or 'bad-quality' economic growth. This development pattern is characterised by low labour intensity, low human-capital accumulation, rural neglect, high corruption, etc.

This emerging consensus thus provides significant support to the developmentalist view, while it downplays the class-based approach without totally discarding it. A strong point in case is that it is hard to empirically point to countries where poverty alleviation has been achieved without economic growth or with very low rates of growth. This is because the political-economy obstacles of redistribution are much larger if one needs to *take away* a piece of a stagnant sized cake from the rich, rather than have them accept that they will receive less of whatever *increment* there is in the cake.

3.2 Inequality and growth

Inequality is important for the poverty discussion in two major ways. As explained in Section 2, people living in and around forests, just like other people, do not only care about their own absolute incomes. Their welfare perceptions also depend on their income status *vis-à-vis* 'the Joneses'—the individuals, households or communities of reference that they would like to 'keep up with'. In other words, inequality levels and changes induced by economic growth also matter for perceptions of poverty or well-being.

In principle, continuous economic growth under a constant income distribution[8] must necessarily reduce absolute poverty, defined as the proportion of people below an income-poverty line.[9] In practice, however, economic growth usually *does* change the income distribution—the extra pieces of the growing cake are not distributed in clinically equal relative shares to all members of society. A number of processes at different scales can explain that.

Micro and macro level processes

Most development practitioners know the following situation. When a development project in a remote forest community is initiated, trying to open up new channels of income (and other benefit) generation, not all community members benefit equally. Some have assets or skills that put them in a privileged position to take advantage of the new opportunities. Others simply have a more developed entrepreneurial spirit, less risk aversion and/or a greater willingness to invest resources in a new, still experimental activity. Consequently, they respond more quickly and reap higher benefits—or suffer higher losses if the project fails. Although the project manager may try to counteract this tendency by 'targeting' certain groups or by promoting a broader 'participation', one often witnesses a rise in inequality.

This mechanism tends to be particularly pronounced in response to new market opportunities. At the beginning of an economic development process, higher market contact often increases inequality as individual actors respond to favourable prices or other newly emerging opportunities. This may also impact the social coherence of communities and ultimately, have some negative welfare effects. Obviously, this is what many researchers worry about at the micro level, justifying scepticism towards economic growth. On the other hand, equalising factors may start to work over time: more people acquire the necessary skills or assets, new technologies spread to more producers, more efficient markets eliminate price differentials across locations, demand for unskilled labour increases and the higher income has local multiplier effects (e.g. increased demand for locally produced commodities). These are some of the micro-level mechanisms that have justified the hypothesis that inequality follows an inverse U-curve over time—inequality rises in the initial development phase but then declines.

Similarly, there are macro-level processes that can 'drive' such a development in inequality over time. Imagine a country with a large, low wage traditional sector employing 99% of the labour force and a tiny, high wage modern sector 'island', accounting for 1% of employment. Imagine also, that the wages in each sector remain fixed, so that economic growth in this dualistic economy can only be achieved by modern sector enlargement: 3% of the total labour force are transferred each year from the traditional to the modern sector. It can be shown that national income inequality (e.g. measured by the Gini coefficient[10]) in this trend scenario will follow an inverted U: it will rise initially and then start to fall (Williamson 1985). This dualistic process has high relevance for many developing countries. For example, relating to changes in the rural-urban or formal-informal sector distribution over time. Conversely, particular developing countries without dualism, such as the urban enclaves of Hong Kong and Singapore, were able to significantly reduce income inequality right from the outset of their high growth periods, without an initial rise in inequality (Wunder 1987).

The inverse U-curve can also be supported by other societal trends over the course of economic development. During the early stages of development, skills and higher education are limited to a small group of people, who benefit the most from economic growth. Over time, the greater spread of skills and secondary and tertiary education will have an income equalising effect, through reducing large skill premiums. Similarly, development of insurance markets tends to improve risk management. Sharing risk between economic agents becomes another equalising force.

From a forestry point of view, Bornschier (1983) has suggested an interesting hypothesis: the inverse U-curve may be linked to shifts in the society's dominating production systems. Inequality thus rises in the transition from hunter gatherer to subsistence agriculture and further, to commodity oriented cash crop agriculture, implying larger production scales and a gradual concentration of assets. Subsequently, in the transition to industrial systems, political and economic pressures towards income and asset redistribution increase, which eventually produces a decrease in inequality.

Empirical evidence

Is inequality actually following an inverted U-curve—or is it just a theorist's *fata morgana*? Do things have to get worse (more unequal) as an initial result of growth and structural change before they eventually can get better (more equal)?

In his pioneering article in the 1950s, Simon Kuznets—the 'father' of the inverse U-curve or Kuznets curve—observed this empirical pattern over time in three developed economies (the United States, Germany and the United Kingdom). He also noted that inequality levels were somewhat higher for some low income countries (e.g. Ceylon, Puerto Rico and India)

and considerably higher for a few developing countries (e.g. Kenya and Rhodesia) which, at that time, had relatively rapid growth rates (Kuznets 1955). Later, Kuznets backed up his conclusions with time series for 16 countries, 9 of which were developing ones (Kuznets 1963). Over the long term, inequality seemed in most cases, to be reduced well below the 'initial' level: "The distribution of income tends to be more equal the longer and more thoroughly the country has been exposed to the processes of economic and social change associated with the idea of industrialization" (Kravis 1960).

The Kuznets curve has been seen by many, as one of the empirical regularities in economic development. However, since the mid-1990s, many scholars have questioned the existence of such a pattern (Deininger and Squire 1998; Ravallion 2001; Fields 2001). Due to the lack of reliable income-distribution time series information from developing countries, there are huge problems in testing any hypothesis related to income inequality. Many researchers have thus tested the Kuznets hypothesis from cross-country data. Yet, the problem is that the inter-country differences are normally much larger than the variation determined by the development phase, so the cross-country pattern therefore cannot be given a time series interpretation. Specifically, some middle income countries in Latin America and the Middle East are very unequal and come to dominate the cross-country pattern—in spite of the very limited true changes over time and income that have occurred within these countries. Hence, the U-curve critics argue that the income distribution tends to be very different across countries but fairly stable over time. Thus the structural differences across countries can create the illusion of an inter-temporal Kuznets curve.

Nevertheless, some maintain a general support for the Kuznets curve (e.g. Williamson 1997). China provides an affirmative case of a dualism-type Kuznets curve. After 1984, income inequality rose as a result of a widening gap between the high growth urban/coastal areas and the rural hinterlands (Lindert and Williamson 2001). Inequality increased in China (and in Indonesia and Russia) "by differential access to the benefits of the new economy, not by widening gaps among those who participate in it, or among those who do not" (*ibid*). Although inequality in China has increased during the recent high growth periods, trickle down effects have still made the poor better off in absolute terms. The number of Chinese who are poor by the 'one dollar a day' standard has decreased by about 186 million over the last 30 years (Sala-i-Martin 2002).

Generally speaking, the income distribution time series data is too poor to fully resolve the Kuznets controversy. In some cases, inequality rises, in others it decreases (Ray 1998; Fields 2001). Why do the micro and macro level processes from above not consistently produce Kuznets curves at the national level? One possibility is that aggregated national data 'conceal' micro processes by adding data for regions at internally different development stages. Another is that the preconditions and types of growth eventually matter more than income levels in regard to how economic growth changes the income distribution. This is the topic of the next section.

3.3 Pro-poor preconditions and growth types

To sum up so far, macroeconomic growth in most cases 'trickles down' to raise the absolute incomes of the poor, at least over time and at aggregate scales. In general, the poverty record of economic growth is thus better than its reputation. Fields (2001) concludes from his literature review: "It is overwhelmingly the case that growth reduces poverty and recession increases it, though in about 10 percent of the cases, poverty did not appear to fall when growth took place". Likewise, Ravallion (1997) notes on the Human Development Reports (see Section 2) that "Arguably the biggest problem facing the world's poor today is not 'low quality growth'—in HDR terms—but too little growth of even quite normal quality!"

This also means that we should not be universally prejudiced about situations where 'the size of the cake increases but the poor only receive the crumbs'. One cannot dismiss all these scenarios as undesirable. Sometimes, the indirect pro-poor effects from forest derived profits could be large—though not necessarily to the benefit of those poor who live in and near the forests. In any case, country experiences of growth cum poverty reduction are variable. Can this be explained by the countries' different preconditions and growth paths, respectively?

Preconditions

Strong evidence suggests that an egalitarian asset distribution—in particular of land and human capital—will enhance the poverty reducing effect of growth. The combination of land reform, together with improved

infrastructure, education and labour intensive urban growth, was a key success factor in post-WWII South Korea and Taiwan, in dramatically reducing both poverty and inequality (Wunder 1987).

Across Indian states, the variable degree of literacy is the prime factor explaining different growth-poverty outcomes (Ravallion and Datt 2002). In terms of the reverse causality, high asset inequality in poor countries can also obstruct growth in the first place (Barro 1999). Conversely, a population with widely distributed skills across regions and socioeconomic groups is an important growth promoting asset. Growth thus tends to make economies with an initially equal income distribution more equal, while conversely it can also reinforce large pre-existing inequalities (Ravallion 2001).[11]

Pro-poor growth

We know from the work in UNDP (Human Development Reports) and the World Bank that the type of growth path matters (i.e. that the 'quality of growth' (Thomas *et al*. 2001) has a bearing on poverty). What types of growth then, are most likely to be pro-poor? Obviously, tailored approaches are always preferable to one size fits all statements but in cutting through the debate at a general level, it is beneficial for poverty reduction to have a growth path emphasising any combination of the following five factors:

(1) More education

Education is a direct and embodied investment in poor people—once the asset has been built, nobody can take it away from the poor. Education and particularly improved and more extensive primary education, represents a valuable pro-poor human capital. For instance, Sen (2001) argues that one main difference between the recent growth paths of China and India has been the larger education emphasis in the former, triggering greater poverty reduction. Investment in education is the single most important factor in simultaneously promoting economic growth, poverty reduction and a more equal income distribution (Thomas *et al*. 2000).

(2) Rural focus

Rural growth tends to reduce inequality in particular, especially in the early development stages when the bulk of the poor are actually rural based (Mellor 1999). Investments in rural infrastructure, technology and R&D can help support this strategy, as for instance, under Indonesia's New Order policies (Hill 1992; Warr 2000). Conversely, countries that try to 'jump-start' modern sector development with strong urban biases tend to reduce poverty to a much lesser degree.

(3) Labour intensive technologies

While education is the prime pro-poor asset to endow the poor with, unskilled labour is the most important asset they already possess. Growth paths that favour a higher demand for unskilled labour will tend to raise employment and wages, which helps to alleviate poverty. Such labour intensive sectors can be rural (e.g. small scale agriculture or wood processing) or urban, with the latter including industries like textiles, electronics or construction and services such as tourism or commerce. Conversely, growth strategies that are highly intensive in the use of natural capital (e.g. mining or oil) or in man made capital/high skill technologies, are unfavourable to the poor, especially in early development phases.

(4) Technologies for pro-poor consumption goods

The poor not only benefit from growth in their nominal incomes, but also from technologies that make the goods they consume cheaper in the marketplace, thus increasing their purchasing power. Staple crops are a primary example. The evidence suggests that urban consumers, not rural producers, capture the lion's share of the benefits from new agricultural technologies. Increased food supplies tend to lower food prices because food markets in developing countries tend to be competitive and elastic demand causes prices to decline. This is why the Green Revolution was good news for poor urban consumers—their staple crops became considerably cheaper.

(5) Good governance

Clear legislation and transparent government policies that recognise (the often informal) rights of poor people over land and resources are important in creating benefits for the poor. In regard to forests, an important negative example is the extraction of high rent products from rich natural forests, where valuable economic rents (defined here, as high profits from exploiting natural resources) are often captured by elites who manage to influence policies and rules in their favour (see later discussion). Specifically, it has been shown that a high incidence of corruption has a strongly anti-poor effect (Thomas *et al*. 2000).

4. Using Forests to Cushion and Reduce Poverty

4.1 The forest-dependent poor

> *"More than 1.6 billion people depend to varying degrees on forests for their livelihoods. About 60 million indigenous people are almost wholly dependent on forests. Some 350 million people who live within or adjacent to dense forests depend on them to a high degree for subsistence and income. In developing countries about 1.2 billion people rely on agroforestry farming systems that help to sustain agricultural productivity and generate income. Worldwide, forest industries provide employment for 60 million people. Some 1 billion people depend on drugs derived from forest plants for their medical needs."* (World Bank 2001)

This recent quote from the World Bank reflects a widespread desire to put numbers on things that are thought to be important—in this case, how important forests are to different groups of people. While both environmentalists and forestry advocates may welcome this type of exercise, its empirical foundations are shaky. It is no accident that these guesstimates are not backed up by specific sources—to the best of our knowledge, the sources simply do not exist. Is it likely that one fourth of people on Earth (or about half of the global rural population) are 'forest-dependent'? Does 'forest dependence' mean everything from 'generating most of household income' to 'generating *any* household income' and to 'using *any* kind of forest products'?

A recent study commissioned by the British Department for International Development (Calibre Consultants and SSC 2000) set out to quantify the number of forest-dependent people but in the end, had to give up. 'Dependence' criteria are too variable and the statistical sources are very deficient. Byron and Arnold (1999) came to the same conclusion. So, just how many people depend on forests? The first answer is: that depends completely on how 'dependence' is defined. The second answer is: due to a lack of any comprehensive data sources, we do not know for sure but probably *tens of millions* of people depend on forests as a *dominant* source of subsistence and cash income, while *hundreds of millions* depend on forest products in some *supplementary* way. The latter would include not only primary forest users but also those among the poor who trade, further process and consume forest products, including those in urban areas (Byron and Arnold 1999; Kaimowitz 2002).

The forest benefits to poor people can be categorised in a number of ways. We suggest five dimensions. One approach is to look at different groups of beneficiaries. A second is to evaluate the types of forest products and services provided. A third way is to differentiate the role of forest benefits in the household economy or livelihood strategy (e.g. subsistence use *vs.* cash income; gap filling *vs.* regular use). A fourth dimension refers to the extent of resource management (i.e. from pure natural forest extraction to lightly managed and planted forests/forest products). Finally, a fifth distinction is between high and low rent products. All these dimensions have important bearings on the size and type of poverty alleviation potential and will be dealt with throughout this section. In Table 1, we combine the first two dimensions (user groups and types of benefits), while in Section 4.2 we discuss the other three dimensions.

We structure this section according to the type of benefits concerned. One of the forest benefits in Table 1 does not involve traditional forest products and services—but converting forests (temporarily or permanently) to agricultural land can be one of the most valued benefits locally. 'Shifting cultivation' represents an intermediate case between permanent conversion and conventional forest products, where soil recuperation and fertilisation through biomass burning and decay are an essential part of the process. Including such agricultural uses in the debate also raises the point for discussion about how much forest is 'optimal', but this is beyond the scope of this current paper.[15]

In the following section we concentrate on three areas: non-timber forest products (NTFPs), timber and environmental services. In some cases, the distinction between timber and everything else (NTFPs) is artificial, which is why we distinguish various sub-categories and dimensions of NTFPs. Some of the NTFP discussion is also relevant to small scale timber use by poor people. At the same time, the two debates have differed and NTFPs and timber are characterised by distinct production systems—which has a direct bearing on the types and magnitude of benefits obtained by the poor.

Table 1. The Importance of Different Forest Benefits to Different Groups[12]

User groups[13]	Types of economic benefits			
	(A) Agricultural land & nutrients	(B) NTFPs	(C) Timber	(D) On-site ecological services[14]
(1) Forest dwellers:				
i. Hunters and gatherers	Minor benefit	Main benefit	Supplementary if transport access exists	Variable
ii. Shifting cultivators	Main benefit	Important supplement	As above	Variable
(2) Farmers living adjacent to forests:				
i. Smallholders	Major 'land reserve'	Supplementary	Supplementary if transport access exists	Variable
ii. Landless	Not important	Important supplement	As above	Variable
(3) Commercial users:				
i. Artisans, traders, small entrepreneurs	None	Important	Important	None
ii. Employees in forest industries	None	Supplementary	Main benefit	None
(4) Consumers of forest products:				
i. Urban poor	None	Some 'pro-poor' products	Variable	None

4.2 Non-Timber Forest Products (NTFPs)

4.2.1 A heterogeneous group

NTFPs cover a wide range of products, which are utilised in very different contexts and play different roles in household livelihood strategies. Four key dimensions (from above) are:

(1) Degree of management and domestication: from pure extractivism to intermediate systems ('soft management') and fully domesticated products
(2) Subsistence uses vs. commercialisation
(3) Safety net function (gap filling and insurance) vs. regular income source
(4) Low vs. high returns—to labour, land and sometimes capital.

With this wide diversity, one might object that any generalisation about NTFPs would be speculative. Yet, existing overviews (Byron and Arnold 1999; Neumann and Hirsch 2000) suggest that most NTFPs produce low returns (particularly in terms of return per ha and often, also per labour unit), are primarily used for subsistence and often fill income gaps, however they are seldom managed more than 'softly' (few planted products). There is a strong correlation between NTFP dependence and poverty, a fact we will discuss in Section 4.2.2.

Global comparison of commercial NTFPs

Some NTFPs have a high commercial value for those involved in their production. Over the last few years, CIFOR has undertaken detailed data collection and comparative analyses of 61 cases involving commercial NTFP production and trade from Asia, Africa and Latin America. These cases were grouped according to their role in the household economy, defined as: the contribution of the product to total household income (importance of product) and the proportion of total household income earned in cash (degree of market integration) (Ruiz-Pérez *et al.* 2003)[16]. Using a cut-off line of 50 % for these two variables, three categories emerged:[17]

(1) ***Specialised strategies***—*high* forest-product contribution to household income and *high* household integration into the cash economy.

*Non-timber forest products serve subsistence needs, can have important gap filling or safety net functions and sometimes provide regular cash income. Here, women are selling plants (*Gnetum africanum*) collected from the forest, maize and cassava flour at the Mfoundi market in Yaoundé, Cameroon.* (Photo by Michael Hailu)

(2) ***Diversified strategies***—*low* forest-product share but *high* market integration.
(3) ***Coping strategies***—*low* forest-product share and *low* market integration.

In the *specialised strategy*, absolute income of forest-producing households was about one third higher than the average (that is, forest producers were better off than their non-producing neighbours). The specialised strategy is associated with a number of favourable conditions: high value-weight ratio, stable product markets, steady household involvement in NTFP production, a low level of product adulteration, a stable resource base and interestingly, a lower incidence of customary resource rules. The products tend to be produced in areas where land tenure is effectively under state administration—the producers have legal rights and do not rely on customary rules.

The specialised strategy is also associated with more intensive management, sometimes by domestication (plantation) but for the majority of cases, perhaps a bit surprisingly, through 'softly' managed forests. Plantation products are found in only one third of the specialised cases, though they have higher yields and fetch better prices. Examples include Brazil nuts (*Bertholletia excelsa* H.B.K.) in the Bolivian Amazon, bamboo in China and cardamom (*Elettaria cardamomum Maton*) in the Western Ghats of Kerala state, India.

The *diversified category* mostly has intermediate characteristics. People produce many other products for the market or are engaged in wage labour—forest products make up a lower share of their household income. Real-world examples are found in all three tropical continents. Producers of benzoin (*Styrax paralleloneurum* Perk) in Tapanuli, North Sumatra, Indonesia, use different management strategies, from forest extraction to agroforestry type techniques, depending on their orientation within the cash economy. The Panamá hat industry in South Ecuador has similar income-supplementary characteristics and so too, do the woodcarving industries in Kenya and Uganda.

In the case of the *coping strategy*, household economies are more subsistence-oriented and the commercial forest products play a lesser role (although the households tend to use many other NTFPs for their own consumption or sale). However, this category also represented the most dynamic group, as people use a wide variety of products over time due to changes in the resource base and prices, and the emergence of alternative income opportunities. Some cases

in point include the production of the *Prunus Africana* bark for medicinal uses in Cameroon and cardamom (*Amomum villosum*) in Vietnam. Note that in spite of a basically similar product as in the specialised case of Kerala, markets were much less consolidated in the Vietnamese case, thus producing a different contribution to the household economy. Thus, not only the product as such matters—its specific role in the local economy can vary.

In geographical terms, the African cases tend to have lower trade volumes and less income but also, growing populations in the case areas and rising market demand—which increases pressure on the resource. Africa is associated with the subsistence strategies and Asia with the specialised strategies. The Latin American cases tend to fall somewhere in between the two and are mostly associated with diversified strategies. These research results thus substantiate a set of common, intuitive perceptions about the regional specificity of forest-products and their differential contribution to the household economy.

4.2.2 'Poverty traps' or 'safety nets'?

There is solid empirical evidence on the positive link between rural poverty and NTFP dependence. In an excellent survey, Neumann and Hirsch (2000) noted the "overwhelming evidence that the poorest segments of the societies around the world are the populations principally engaged in NTFP extraction". This correlation can be approached from two different angles. If we consider poverty to be *exogenous*, the question becomes: *Why are poor people forest-dependent?* The poor often use forest products due to the (permanent or temporary) lack of better alternatives. We can then use the correlation to argue that forest products function as *safety nets*. On the other hand, if we consider poverty to be *endogenous*, the relevant question is: *Why are forest-dependent people poor?* Perhaps most forest products are bound to be economically marginal, so they *per se* offer a poor potential for value generation. In that case, could forest products be considered a *poverty trap* rather than a safety net?

Safety nets?

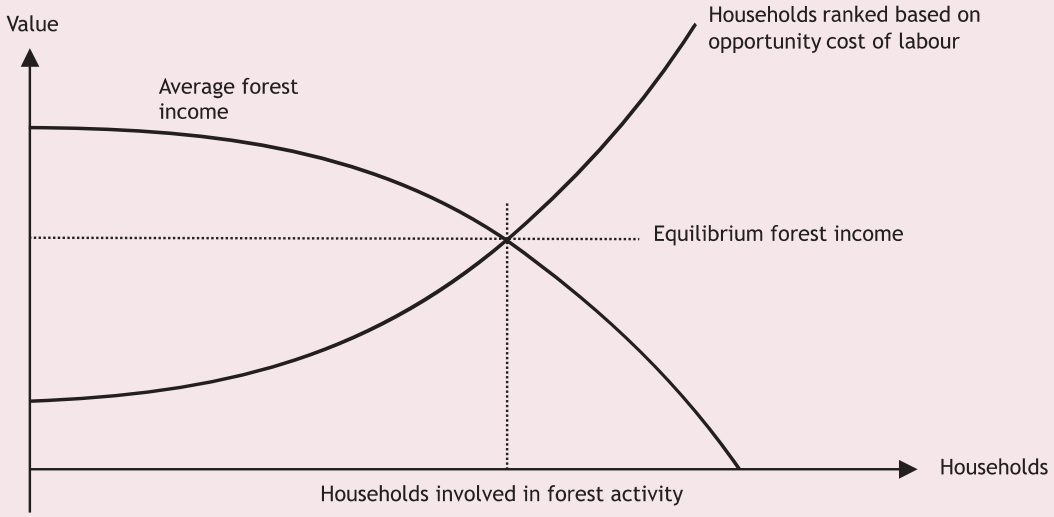
Back to the aforementioned question—why should poor people rely relatively more on forests and forest products? We first reiterate the basic characteristics of most NTFPs: (1) Low or medium returns to labour; (2) Low capital and skill requirements; and (3) Open or semi-open resource access. These features reflect the rudimentary developmental characteristics of forests. Most of these features favour poor people, who have no access to markets for skilled labour (otherwise, they would hardly be poor in the first place) and hence have a low opportunity cost of labour. The poor also lack the cash or access to credit to involve themselves in capital-demanding self-employment activities. With a lack of assets or political power to get access to more valuable resources, they turn to a low rewarding 'employment of last resort' (see Box 1).

The high level of involvement of poor people in NTFPs must also be understood in the light of risk aversion, which induces diversification. In fact, the presence of high risks impedes a greater degree of specialisation in the most rewarding activities and can thus be a main causal factor of poverty *per se*. Forest products are normally not the principal cash earners of poor households. On the other hand, they can have important 'gap filling' functions. Unlike regular income contributions, these benefits accrue unevenly over time. "The importance of forest product income is usually more in the way it fills gaps and complements other income, than in its absolute magnitude or share of overall household income" (Byron and Arnold 1999). On the subsistence use side, "forest products seldom provide the staple, bulk items that people eat" (*ibid*). However, NTFPs are widely used to overcome seasonal food shortfalls (e.g. before the main harvest) or serve as substitutes during emergencies.

Analytically, when we speak about forest 'safety nets' and 'gap filling', two slightly different types of benefits seem to be involved. On the one hand, for example, a household gathers certain forest fruits each year in the months between staple harvests. These fill a gap in the sense that they provide a periodical, reasonably predictable contribution to food security (and possibly also cash income), serving as a seasonal buffer. Seasonality can also be induced by employment cycles, i.e. some forest collection is carried out only in seasons when family labour is abundant. Part of the comparative advantage of NTFPs is therefore that they increase the seasonal flexibility of rural livelihoods.

On the other hand, there are income shortfalls that are much harder to predict, such as family illness, political turmoil, macroeconomic

Box 1. The 'Employment of Last Resort' Model



Why are the poor forest-dependent and the forest-dependent poor? Many forest activities have low entry costs (open access) and few requirements in terms of skills and capital. Such characteristics are attractive to the poor but they also lead to the activities becoming an 'employment of last resort', due to their low return.

This model can be illustrated graphically. First, assume that we rank all the households in a village according to the opportunity cost of their labour, that is, the best non-forest income opportunity they have. This is shown by the rising curve, i.e. those with the lowest opportunity cost are found to the left. The opportunity cost of labour is strongly correlated with income, so the poorest households will tend to be to the left side of the figure. The declining curve shows forest income per household. This income is a function of many factors: the resource base, technology, market prices, etc. It also depends on the number of people involved in a given forest activity. When more households become engaged, at a certain point competition for the resource will drive down average incomes, which is why the curve is downward sloping.

How many households will get involved in forest activities? Villagers will choose the activities that provide the highest return for their labour. Hence, households with the lowest market value of labour will get involved in forest activities, i.e. those to the left of the point where the two lines intersect. They will earn more than their opportunity costs of labour. Those that do not get involved are better off working elsewhere. Thus, the poorest households will tend to be forest-dependent and vice versa, forest activities only attract poor households.

What happens if the price of the forest product in question goes up, that is, the downward sloping line shifts upward? Forest income goes up but less than the price increase because new households are attracted into the forest and that in itself will push the income down.

What happens if new employment opportunities are created, i.e. the opportunity costs curve shifts upward (at least in the range around the equilibrium)? Some previously forest dependent households will be able to earn more elsewhere and will leave the forest. But also, the remaining poor will benefit when the number of households involved in forest activities drop. This model therefore demonstrates an indirect trickle down effect.

The model provides a simple exposition of the 'employment of last resort' approach but as all models do, it simplifies reality and the factors that make the poor forest-dependent. Some of the underlying assumptions behind this model are: (1) All households receive an equal share of forest income; (2) Forest income is negatively correlated with the number of people involved, i.e. there are no net economies of scale in management, processing or marketing, etc.; and (3) We do not take into account the seasonal fluctuations of labour demand. A more sophisticated model would include these features (see also discussion below) but this would not alter the underlying logic of the model: households with a poor asset endowment resort to low-return activities—from forestry or other 'last resort' activities, while those with better opportunities find employment elsewhere.

crises or ecological disasters. Forest products can have important roles in overcoming these unpredictable shortfalls, either as a reservoir of auto-consumption goods or as a source of 'quick cash' raised from collecting forest products and taking them to the marketplace. Can we simply quantify these benefits by summing up their average contribution to subsistence and monetary incomes? No, because the 'safety nets' imply more than that. They can make the difference between good and bad nutrition, between recovered health and prolonged illness or between food security and starvation. Ultimately, safety nets help people to survive.

Nevertheless, a warning is necessary. Any on-site assessment of forest based safety nets also has to consider whether these are truly irreplaceable over time. In many cases, in the course of reduced forest access, poor people manage to build alternative safety nets. They may buy a couple of cattle or diversify their agricultural production. They may also be able to obtain seasonal off-farm employment or send a son to work in the city so he can send home remittances. In other words, forest based safety nets may be only one among several safety nets available to the poor household.

Poverty trap?

Turning the above question around—why are forest-dependent people poor? One can similarly put forward several arguments to explain the forest dependence-poverty link. The main problem is the low returns from most NTFP activities, as discussed above. So, why do NTFPs tend to be low value resources? In spite of their ecological richness, natural forests are frequently economically inferior production environments. One type of argument here concerns the resource *per se*. For instance, low per hectare densities of commercially valuable species imply that extraction tends to be spread over large areas, triggering high costs of harvesting and low net returns to extractive labour. There may be sharp and unpredictable year to year fluctuations in the production from trees and other plants, forest animals may follow migration and many products have a heterogeneous quality that it is difficult for the extractor to control. If market demand for a forest product is increasing, there may be large physical obstacles relating to the increase of yields in a natural forest environment.

Secondly, remoteness and low population density often mean that physical infrastructure (roads, rail, bridges etc.) is poorly developed, complicating market access. This is even more problematic when the NTFP concerned is perishable. Usually, only a few high value products can thus pay their way out of the forest. The net benefits per area unit thus tend to be too low and/or too short lived to justify the transaction costs involved in establishing and enforcing property rights to land and resources. Yet, without secure property and access rights, there will be little incentive to invest and undertake more intensive management, which would potentially elevate returns. Consequently, NTFPs commonly continue to be collected under *de jure* or *de facto* open-access conditions.

Thirdly, some forest-product trade is characterised by monopsonies and exploitative marketing chains, due to one or several characteristics.[18] The heterogeneity and quality differences of some products, combined with a lack of well defined standards, can lead to intransparencies and manipulations in the marketing process. Perhaps most importantly, the remoteness of many forest communities reduces their level of incoming information about changing market prices and their bargaining power *vis-à-vis* there only being a few traders, is low. Hence, not only do forest products face constraints in their aggregate value. The remote and isolated producers also tend to receive a low share of that reduced value.

Obviously, this trinity of imminent misery does not apply uniformly to all NTFPs. There are examples of products that break the deadlock and produce sizeable profits over and above the average forest-product returns. So, what happens in this situation, where there is a sustained increase in market demand and prices? Many studies have pointed out that the poor do not necessarily benefit. In the following, we outline four different reasons.

First of all, a more valuable resource will suddenly become increasingly attractive to the more powerful external stakeholders who previously ignored it. They now have an incentive to actively exclude the poor from access (Dove 1993). There are several ways in which the rich can capture the resource rents. Through their political connections and power, they can redefine the rules of access to those forests where tenure was informal or weak. They can also control marketing and processing chains through their networks and capital. This line of reasoning links to the more general argument that it is difficult for poor people to gain and maintain control over resources that are producing high economic rents.

Secondly, higher resource scarcity and corresponding values of forest products can trigger internal processes of differentiation among the traditional producers, resulting in economic inequality (see Section 3). Scarcity promotes individual property rights, replacing more inefficient yet egalitarian common property regimes (e.g. Eggertsson 1990). Paradoxically, adding value to NTFPs might thus lead to the collapse of the institutions that made them attractive to the poor in the first place. "The increased commercialisation of NTFPs is likely to *eventually* lead to the breakdown of common property systems and a trend towards individual private property" (Neumann and Hirsch 2000). Even in intra-household terms, men will often begin to capture resources traditionally controlled by women when the resources become more valuable, thus adding a gender dimension to the power over resources.

Thirdly, high economic rents may lead to overexploitation and collapse of the resource base of a common property resource. As already mentioned, supply from natural forests is normally inelastic—it is difficult to significantly increase production out of a fixed size forest area. In the absence of well enforced management regimes involving all user groups (and excluding outsiders from entry), higher prices might enhance a 'tragedy of the commons'.

Finally, as a related response to scarcity, higher prices can make it profitable to domesticate the resource. That is, eventually moving the resource supply out of the forest and gradually replacing extraction with cultivation. While this may increase aggregate values and profit margins, it also requires land, capital and skills, which may imply that the more well endowed producers become better positioned. Alternatively, sustained high price levels can also make it worthwhile to develop different products—synthetic or natural substitutes. Both latter options raise overall supplies and bring down prices but they also reduce the market shares of both forest-derived products and poor forest based producers (Homma 1992).

In all four instances, forest products are part of a deadlock scenario. They yield low returns and paradoxically, trying to raise these returns might make the situation worse for poor producers, unless underlying (and often complex) socioeconomic and political constraints are addressed simultaneously. Although this picture represents trends rather than a deterministic framework, it points to some of the challenges facing those who would like to develop interventions to advance the case of poor producers of commodities from (natural) forests.

So, does this make non-timber forest products a 'poverty trap'? To us, it would seem unfair to use this label in a general manner, given that NTFPs in many cases provide important livelihood contributions to people with limited or no alternatives—contributing to their income and providing a safety net against a series of risks. Although most NTFPs are poor instruments for poverty *reduction*, some are important for poverty *prevention*. Preventing extreme poverty and helping people survive can hardly be called a poverty trap. However, "care needs to be taken not to commit communities to institutional arrangements which they are unlikely to be able to sustain once the incentive of reliance on forest products diminishes" (Arnold and Townson 1998). The 'trap' label would be justified in those cases where alternative development options actually exist but where policies, donor projects or other external interventions seek to maintain people in their low yield forest extraction activities, based on romanticised visions about the alleged ecological sustainability and large income generation potential of NTFPs.

4.2.3 Fuelwood—the neglected pro-poor NTFP?

In our reading of the literature, wood based fuels (firewood and charcoal) often fall into the 'no man's land' between non-wood forest products and timber. Thus, governments, private firms and donors have mostly ignored them in recent times—especially since the reappraisal of what, in the late 1970s, was erroneously perceived to be a *global fuelwood crisis*. However, fuelwood continues to be vital for a lot of poor producers and consumers, with the bulk of rural households in developing countries using firewood as a domestic source of energy. Yet, a recent literature survey by Arnold *et al.* (2003) shows that its commercial role can also be significant. For example, in peri-urban areas of sub-Saharan Africa, tens of thousands of poor farmers and small traders supplement their incomes by selling fuelwood. Sometimes this activity even becomes their main source of cash income. Notably, this group also includes the poorest of the poor. For instance, many rural landless people are among those specialising in fuelwood production.

The most dynamic commodity is charcoal, the more sophisticated and almost entirely marketed cousin of firewood. With its higher energy content per weight unit, charcoal pays

its way much more easily into the cities than firewood and the local value added clearly benefits poor producers. Its less bulky storage and many speciality uses often increase charcoal demand over time, while firewood demand correspondingly becomes stagnant or goes into decline. In Africa, fuelwood demand is more resilient than in Asia and Latin America—where higher incomes are accelerating the transition to fossil fuels and electricity.

Firewood and charcoal markets share important pro-poor features with other NTFPs. They require low technological levels, limited skills and have small market entry costs. These factors favour a structure of many small suppliers and (therefore) low commercial margins. The products are economically inferior goods, that is, per capita demand declines with increasing income, especially for firewood.

Taking a dynamic perspective, there seem to be two main production stages. Firstly, when forests and wood resources are still abundant, harvesting is non-sustainable, with the resource being 'mined'. Still, many observers exaggerate the destructive impact on forests of fuelwood harvesting. Fuelwood producers often piggyback on agricultural land clearing and thus use trees that would have been felled anyway.

In the second stage, when forest conversion is nearing an end, wood supplies become scarcer. Higher prices often encourage tree growing and sometimes, a higher efficiency in the use of wood. Supplies are then drawn from a larger number of producers, regions and ecosystems. In particular, trees outside natural forests (e.g. small woodlots and trees on farms) become dominant sources of supply—to the extent that it can be asked whether one necessarily needs forests proper to maintain fuelwood supplies. This demand presents good tree planting opportunities for smallholders, especially in peri-urban zones where transport costs remain low. Fuelwood is thus important for the poor at various stages of the forest transition.

What points of leverage exist for pro-poor policies? Regarding subsistence uses, Arnold *et al.* (2003) suggest community level interventions that secure poor people's supplies. For example, as when newly introduced crops cause land scarcity that leads on to the privatisation of communal lands or other forms of exclusion of the poor. For commercial uses, they recommend taking fuelwood more into account as an important side product in forestry interventions. They also propose the deregulation of government restrictions, which would serve to reduce petty corruption and benefit the poor. Other proposals include large scale plantation projects, more energy efficient processing technologies and the introduction of high yielding species.

It is likely that most of these suggestions only make sense in the second stage of the forest transition, when wood scarcity feedback loops have kicked in. Even then, the potential for poverty reduction needs to be carefully assessed. Yield enhancing measures would benefit innovative producers, though extension services and communal arrangements can broaden the reach. However, widespread adoption would also increase supplies in markets with inelastic demand. This would reduce market prices, thus crowding out other small suppliers or reducing their profits. What is gained in benefiting one group of poor producers can thus easily represent a loss for others.

4.2.4 A synthesis and conclusion about NTFPs

A key insight for the forest-poverty discussion from the literature is the ambiguous role of NTFPs. *The very same characteristics that make them important and attractive to the poor in the first place also limit the potential for further income increases*. By the same token, some of the measures designed to elevate the level of sophistication and raise economic returns may risk crowding out the poorest of the poor (as they may lose their comparative advantage as suppliers). We should add though, that a similar dilemma arises in other informal sectors in developing countries.

The general asymmetry is well summarised by Neumann and Hirsch (2000): "Although NTFPs are extremely critical for the rural poor as a livelihood strategy, … they rarely provide the means of socioeconomic advancement". Campbell *et al.* (2002), in a comprehensive household study of two villages in the drylands of Zimbabwe, found that a large variety of woodland products filled important roles in the coping strategies of households, especially the poorest ones and in particular, *vis-à-vis* seasonal income shortfalls. But they also conclude that, "While the woodlands are important as a security…we found no evidence that they are able to lift people out of poverty" (Campbell *et al.* 2002).

NTFPs and other extractive forest products are currently threatened, both from overexploitation and habitat destruction. "Nearly

everywhere users of forest products are faced with a decline in the size or quality of the resource from which they obtain their supplies" (Byron and Arnold 1999). In regions across the developing world with dismal prospects for economic development, the challenge may be to *maintain* the supply of NTFPs and their role as a safety net—unless other activities and resources can take on that role. One might argue that forest products are more important to *prevent worsening poverty* than to promote socioeconomic advancement. Stressing the safety net role becomes more critical if one focuses on the very poor. A diminishing resource base, combined with few opportunities or a low ability to take advantage of other opportunities, places them at risk of further deprivation.

The somewhat pessimistic conclusion about NTFP development as a means to increase forest based income does not imply that this is never possible. For instance, Fisher (2002) demonstrates in a case study from three rural villages in Malawi that asset poor, forest-dependent households during her single year income survey actually did at least as well in terms of income and asset building as the better off households with other specialisations. However, in general, the number of cases with successful pro-poor forest product development is very limited (Fisher 2001). NTFPs are definitely not the 'silver bullet' that some were hoping for a decade ago. Silver bullets are generally rare, particularly in the field of conservation friendly poverty reduction—though understandably, that does not stop people from searching for them.

Successful pro-poor forest development implies both increasing the value added to products (the size of the cake must increase) and ensuring that the poor's share of the cake at least does not shrink. There are many ingredients for success, as noted by Arnold (2001): pro-poor institutions, skills, marketing channels and reduced middlemen profits are among the most important. As mentioned earlier, an ongoing global-comparative research project within CIFOR is analysing what generally applicable success factors for forest-product development can be identified.

Finally, degrading ways of using forests can sometimes help to lift people out of poverty, especially in forest-abundant environments. People may opt to cash in forest capital and then invest it in more profitable alternatives outside the forest sector (e.g. cattle, arable land, a means of transport, small business, education or migration). In this case, from a livelihood perspective, some natural capital is thus deliberately sacrificed to accumulate other types of capital. Although an 'unsustainable' strategy from a forestry sector perspective, forest mining can, from an individual (and sometimes also social) perspective, be a perfectly rational strategy to reduce poverty. Human history is full of examples where this strategy has been followed.

4.3 Timber

In spite of the undeniable role of NTFPs, timber is commercially the most important product in most forests. As much as NTFPs tend to be the poor person's lot, the benefits from timber often seem to be captured only by the rich. If this is true, what are the reasons? And what could possibly be done to increase the benefits for poor people from timber? In this section, we first consider some general characteristics of timber harvesting in the tropics. We then take a brief look at three different pro-poor timber options for smallholders: management of natural forests, tree growing and wood processing. The section is closed with a discussion of the indirect benefits for the poor in the rest of the economy, from timber production, supplies and income.

4.3.1 Why have the poor not benefited from timber?

There are some fundamental characteristics of timber planting, harvesting and processing (and some features of trees as assets) that prove to be 'anti-poor' in that they require capital, skills, land tenure, technology, production systems and time horizons that do not favour poor people. While many of these factors relate especially to logging from natural forests, some are equally valid for forest plantations or trees on farms:

(1) Long time horizon

Tree growing (but not extracting) is a long term investment without significant intermediate returns, often involving high risks in terms of price fluctuations, tenure insecurity and natural hazards (like fire, diseases, etc.).

(2) High capital intensity

Many (though not all) timber related operations require machinery and capital outlays—often to

In most forests, timber is the most valuable commercial product extracted. Yet poor local communities tend to receive only marginal benefits. What can be done to increase the share of local people? Pará State, Brazil. (Photo by Sven Wunder)

a larger extent than the smallholder agriculture that would be a natural comparison. This capital intensity often rises with value added stages, i.e. in the transport, processing and marketing phases.

(3) Technology and skill intensity

At least in the processing stages and sometimes in the primary harvesting, skills and technology are needed to an extent that is often beyond the capabilities and possibilities of poor people.

(4) Economies of scale

Related to (2) and (3), the indivisibilities of investments in transport, processing and marketing often mean that businesses only become competitive above a certain minimum production level. Whereas poor producers almost by definition are small scale and only in exceptional cases are sufficiently self-organised to join forces into larger cooperative units.

(5) Specialised markets

End user markets for wood tend to be specialised and are becoming increasingly so. Delivering a specialised product to a targeted public is usually more skill demanding than producing a homogenous one.

(6) Trees are immobile assets

Trees are physically fixed assets that (normally) cannot be moved. Hence, one needs secure land tenure to plant them or at least secure usufruct rights. Otherwise, there is a large risk of losing access to the trees before harvest. Yet, the poorest people often do not have secure tenure and can be pushed out of the land they occupy. Many of them also voluntarily move to other locations to take advantage of new opportunities elsewhere. If they do, they cannot take the trees with them, as they can with their cow, belongings or education.

(7) Trees are pure 'cash crops'

When the markets of food crops fail, poor people tend to switch to subsistence uses—they need something to eat to survive. Unfortunately, few trees are particularly nutritive and digestible. It is harder for tree growers to switch to subsistence uses, though some trees produce fruits and some can be inter-planted with food crops (see 10).

Conversely, timber trees and production can obviously also have some *pro-poor characteristics*. For example:

(8) Flexible harvesting time

Most tree management operations can be done quite flexibly (e.g. during slack seasons when there is labour availability or when cash is needed). This is an important pro-poor argument, as it allows for harmonisation of both tree growing and harvesting with other productive activities.

(9) Trees as savings

Trees can be a form of on-farm savings that grow over time—in some cases without too much labour effort needed—although the 'accumulated interest' (the market prices paid for wood) fluctuates over time.

(10) Multiple use

Forests and tree based systems can provide multiple outputs both for subsistence ('coping strategies') and in supplementing incomes. This is obviously true of natural, biodiversity rich forests and of agroforestry systems but specialised plantations can also produce important side benefits, such as mushrooms or game.

Unfortunately, in many cases the obstacles prevail. Many of the technical characteristics of timber production and the operation of timber markets prohibit poor people from being directly involved. Hence, without being a deterministic feature, an economy built around a leading timber producing sector is unlikely to be particularly advantageous for its poor people. If we recall the five point summary list of common pro-poor growth features from Section 3.3, the only relevant advantage for timber harvesting and tree growing is that it gives some stimulus to the rural economy. On the four other points (education, labour intensity, pro-poor consumption and good governance), the scores are arguably low. The challenge for pro-poor timber interventions is then 'to swim against the tide' of predominantly anti-poor preconditions.

The political economy dimension of timber is just as important as the technical features. Precious timber species fetch high stumpage values, which attract powerful outsiders from both the public and private sectors seeking to capture timber rents (Ross 2001). The aforementioned 'Dove hypothesis' (Dove 1993) is even more valid for timber than for NTFPs. We can expect the rich, those with access to capital and political power, to have the power and incentive to exclude the poor from capturing the bulk of timber rents.[19] The combined effect is that timber values tend to accrue in the hands of a few timber companies and the interest groups they are allied with.

As with other high rent natural resources, high profits from timber can also promote corruption, which can jeopardise the integrity of national institutions, as has occurred in Southeast Asia (Ross 2001). In some cases, high timber profits and other elevated economic rents are also vehicles for violent conflict and civil war (Collier 2000). To the extent that corruption and conflicts come to affect whole regions or countries, other poor people can be negatively affected as well. There is thus an extra-sectoral pro-poor element to good governance in high rent timber sectors.

The benefits to local people from tropical logging operations have in most cases been restricted to transitory employment, small direct compensation payments from timber firms and also, indirect benefits, such as road building, free transport, some social infrastructure and demand for locally produced goods (e.g. foodstuff). In some cases, these development effects are important to local communities. In addition, to the extent that these timber rents are large enough to stimulate significant national economic growth, *some* benefits would trickle down to *some* poor people elsewhere (e.g. through the reinvestment of timber rents in the urban sectors of a capital-scarce developing economy). Such indirect gains would benefit poor people at the national level, not those living near the forests where the timber came from (see discussion below).

Still, there is also some ground for optimism regarding local benefits. At the margin of the dominant anti-poor characteristics of timber, several partially interrelated new trends could raise the share of the timber rents being appropriated directly by the local poor.[20]

(1) Devolution

Due to a redistribution of forestland, local communities now own or control about one fifth of forests in developing countries (White and Martin 2002). This strengthens their options to appropriate timber values.

(2) Decentralisation

The transfer of power to local government and additional local resource control in many parts

of the topics is serving to increase the access of the poor to forest rents—unless local elites manage to fully take over the role that the national elites previously held.

(3) Better governance

Processes of democratisation in many developing countries, campaigns against corruption, a freer press and the involvement of NGOs, all potentially increase the bargaining power of rural communities and the benefits they can appropriate (see also Section 3).

(4) Old concessions

In many tropical countries, commercial concessionaires have over-harvested and not renewed their concessions, which presents an opportunity for forest communities to intercede and compete for access rights.

(5) New technologies

Emerging small scale technologies in sawnwood and plywood production can help small producers to become competitive (see below).

(6) Rising timber demand

In many countries, demand for high volume, low grade construction timber is growing—which the poor, especially in market accessible (e.g. peri-urban) areas may have a comparative advantage to supply.

Some market barriers and bureaucratic regulations have prevented the poor from benefiting from forest products and timber in particular. Government regulations and policies have been geared towards extracting rents and have created strong barriers against the poor's market participation. Some regulations, such as permits, licenses and in particular, requirements for extensive forest management plans, have created barriers to entry for the poor (say, into small scale tree plantations) and often serve as *de facto* vehicles for corruption. Trends of market deregulation, reduced government interventions and campaigns against corruption should therefore provide increased opportunities for poor people.

4.3.2 Can timber be made more pro-poor?

Tropical timber production is normally thought of in terms of large, highly mechanised companies harvesting large concession areas of natural forests. Parallel to this, there is a moderate but increasing share of primary production supplied by small scale extractors, particularly in Latin America. This sector may work either independently or together with the large scale sector (e.g. small scale primary operators selling timber to companies). Following Arnold (2001) and the World Bank (2001), we concentrate in this section, on three major direct timber benefits accruing to the poor:[21]

(1) Local access to and management of natural forests
(2) Smallholder tree growing
(3) Small scale wood processing

Local access to and management of natural forests

As noted by Arnold (2001), the main area for donors' targeting of the poor living in and near forests has been in transferring local management to rural communities. The record is mixed both in terms of transferring real management authority to the communities and ensuring that such a transfer really benefits the poor. A number of obstacles have been noted (most of which also affect decentralisation in other sectors):

- Lack of effective community level institutions, local skills and entrepreneurial spirit
- Forest rent being captured by local elites
- Inconsistencies in statutory laws and regulations
- Bureaucratic hurdles and lack of 'connections'
- Slow institutional change in national forest agencies

As already mentioned, another potential local timber benefit is direct payment from logging companies to forest communities. Such a transfer of part of the timber rent already occurs in many logged-over tropical forests, formally or informally, by law or negotiations. In Cameroon, these arrangements are usually made prior to logging. Companies may pay because they are legally required to do so to obtain access or simply as a means of buying local goodwill for their operations, in order to prevent violent conflict that would damage their interests. But there are also cases, for example, in the Amazon, where timber companies agree to pay post harvest compensations, only to default on their promise.[22]

Given the high timber rents in many tropical forests, the potential for raising payments to local people is significant. Yet, as long as

companies have many potential extraction areas to choose from, forest communities would need to act in a concerted manner (e.g. as a cartel) to strengthen their bargaining position. Providing improved information about logging access fees in other locations can be a first step towards empowering local communities. Another factor that can significantly raise local bargaining power is if communities have a credible alternative to potentially exploit the timber in their own community based enterprises. External technical support to producer organisations, tax incentives or certification schemes can be helpful in this respect.

New pro-poor options in timber production need not only come from redistribution and altered institutional arrangements. *Technological change* might also increase the opportunities for the poor to benefit from increased access to and control over natural forests, and stimulate the involvement of small scale timber extractors. For instance, small portable sawmills demand less capital outlay and should also favour poor people's participation in the production of sawnwood. Technological changes in the plywood industry allow for the use of smaller diameter trees and a greater number of species. Local communities have, at least in the past, been granted control over the commercially less valuable forests. Thus, this technological change could also raise the value of the type of forest they increasingly control.

Demand for paper and paperboard is the fastest growing forest product category and the pulp and paper industry is rapidly expanding. Given the scale of these operations, large companies will probably continue to dominate production. However, this may create opportunities both for poor people to grow trees to supply fibre (see below) and for those controlling natural or degraded forests near pulp mills.

That said, these new technological and market opportunities can also pose threats to the environment. Increased demand for 'any tree of any size' provides strong incentives for over-exploitation, for large companies as well as small scale extractors. The danger is that large companies could clear-cut most of the natural forest and 'rip off' the benefits, while the poor could lose their forest based safety nets and forest-product incomes (see previous section).

In summary, we have claimed in this section that new institutional, market and technological contexts might help to promote poor people's access to high timber profits extracted from natural forests. However, an important final caveat is: to what extent do these profits reflect true stumpage values, compared to downstream value added or market oligopolies and policy-created monopolies? In economic terms, to what extent is the high timber rent we observe in the marketplace a *resource* rent or a *monopoly* rent?[23] How valuable is timber in the hands of poor local people, without the same political power and access to capital and markets? These are critical questions regarding the potential benefits of natural forest devolution and local management (D. Kaimowitz, pers.comm., Jan 2002).

Smallholder tree growing

In many parts of the tropics, particularly in Asia, there has been a significant shift in focus in recent years, from natural forest extraction to forest plantations, with the latter including smallholder tree growing. This partly reflects an increasing shortage of forests and tree resources in some areas, as well as a political reluctance to create large scale industrial forestry plantations. The technological changes referred to above create a growing demand for short rotation species (less than 10 years), which are more attractive to smallholders. This will serve to increasingly extend the forest-product scope, from forest dwellers to people living in established agricultural areas with trees on farm. Significant international credits and grants (e.g. from the World Bank) have gone into smallholder tree growing schemes, including attempts to utilise fragile and unproductive lands. These options may be the most promising in peri-urban areas, where transport costs to the market are not prohibitive. Surprisingly little, however, is known about the impact, for example, of the massive smallholder tree planting efforts in India and China.

Development of closer partnerships between on the one hand, smallholders, producer organisations or communities and on the other, commercial companies, can present a major way forward. As discussed above, this is particularly relevant in those cases were timber in the hands of the poor is worth much less than it is in the hands of a commercial company. An effective partnership between unequal partners—poor local people and commercial companies—needs to be based on the comparative advantages of each. The poor have cheap access to labour and control the land—or at least they credibly threaten external agents' aspirations of control

over land. The companies have easier access to capital, skills, technologies and markets.

The bargaining power of individuals or communities is often weak but mechanisms can be implemented to increase their negotiating abilities (e.g. through producer associations and alternative market outlets). A flow on effect of this should eventually be a rise in the incomes they receive for their trees. Then again, many companies have been caught out due to farmers breaking contracts and selling their products to third parties. Thus, the basic profit and risk-hedging interests of firms must be taken into account in order to make it attractive for them to enter into a partnership (Mayers 2000). Once more, there is a certain trade off between focussing on the size of the cake and on its distribution, both of which affect the poor.

The most prevalent form of such formal partnerships has been outgrower schemes. Mayers (2000) and Desmond and Race (2001) summarise the lessons that have been learned. Partnerships have generally proved to often benefit smallholders but not necessarily the poorest of them. In India, where access to secure land is needed to enter the contract, mainly medium and large scale farmers are involved in the schemes. In South Africa, the pulp and paper company Sappi has been successful in integrating into their scheme more than 8000 small farmers, with a combined plantation area of 88,000 ha (Mayers *et al.* 2001).

Partnership arrangements are highly context-specific and must be viewed within a multi-stakeholder perspective. However, recent CIFOR research has also suggested that some common patterns exist (Nawir *et al.* 2002). For instance, limited competition for land helps make the schemes attractive to villagers. Transparent negotiations and clear information on risks can help make the schemes sustainable. Secure land ownership also clearly favours long term commitments.

Companies often find it easier to deal with individuals than with communities. Indeed, communities are heterogeneous groups with different interests and assets, which makes it difficult to reach and implement agreements that involve long term mutual commitments (thereby increasing the companies' risks and transaction costs). One conclusion has been that "communities as such are rarely suitable units of social organisation for tree management" (Mayers 2000). As a solution in between the options of private and communal partners, producer organisations or cooperatives (with a well defined legal status) may often be more adequate counterparts for outgrower schemes.

Small scale wood processing

Timber can benefit the poor not just through extraction but also through small scale processing. Small scale enterprises can also be large providers of rural employment. In a six country study, FAO (1987) found that *forest-based* small-scale enterprises accounted for between 13 and 35 % of the total employment generated by this group of enterprises.[24] The two main sub-sectors were carpentry/furniture and the weaving of baskets, mats and hats, with both mainly serving local markets. Activities like wood carving and sawmilling/pitsawing provided supplementary employment.

A more recent study (Arnold *et al.* 1994; see Arnold and Townson 1998 for a summary) in six African countries[25] revealed that some 763 000 people were employed in small scale forest enterprises. This makes it an important rural *off-farm* sector, employing on average 2.3 % of the total rural population in the areas surveyed.[26] The largest sub-sectors involved grass, cane and bamboo products (42% of total employment), wood carving (27 %) and forest-product trade (20 %). Woodworking had the fastest rate of growth. These industries are characterised by many small sized activities and intense competition, high turnover levels within firms, small barriers to entry and low levels of technology and capital inputs. Arnold and Townson (1998) extrapolate that about 15 million people could be engaged in such activities in sub-Saharan Africa.

The type of support and policy interventions required depends on the specific products and contexts involved. In many areas the resource base itself—or access to it—is threatened and needs to be better managed. Micro-credit programmes can often provide working capital and help entrepreneurs upgrade equipment and technology, thus increasing the value added. Marketing assistance can also be valuable. Notably, government deregulation would stimulate the growth of small scale industries.

While these activities depend directly on forest-product supply, they lie outside what we defined as 'forestry' proper in the Introduction. The lion's share of the final price that the consumer pays corresponds to secondary processing and much of this is urban based (e.g. Scherr *et al.* 2001 and Arnold 2001). These

'downstream economic effects' are also the key topic of the following subsection.

4.3.3 Forgotten indirect and off-site benefits?

The forest-poverty debate seems sometimes overly focused on micro distributional processes at the forest level ("What share of the timber cake goes to poor local people?"). From a general poverty alleviation perspective, this focus pays insufficient attention to the indirect and economy wide processes that were discussed in Section 3. Here we will briefly look at five of these factors:

(1) Local indirect development effects
(2) National forestry income and export receipts
(3) National forestry employment
(4) Urban forest-product prices
(5) Reinvestment of forestry rents outside the forestry sector

(1) Local indirect development effects

Local multiplier effects from the entrance of timber firms into an area can be significant—in both positive and negative terms—and often far exceeds the direct compensation paid to local dwellers that we discussed above. Though variable from case to case, logging firms often generate demand for locally produced products and services (e.g. lodging, food, assistants, etc.) while they operate within an area. Newly built logging roads often open up opportunities for marketing locally produced goods and can also give local people easier access to health and education services. Roads may be the most considerable, durable benefit, unless they have been constructed in a rudimentary way that only makes them last temporarily.

Conversely, the indirect local impacts of a negative nature can include reduced NTFP production from logged-over forests (e.g. fruit trees, wildlife, etc.), increased fire risks and the introduction of human diseases or social disruptions (including conflicts with logging companies and their workers). Furthermore, most benefits from logging accrue as short lived booms, posing difficulties concerning adjustments when the companies leave.

(2) National forestry income and export receipts

The national income contribution of forestry in general and of timber exports and production value in particular, can sometimes be substantial, though both significant under- and over-estimations take place when these figures are recorded in the national accounts. Under-estimation occurs because a large variety of forest-product subsistence uses, local market sales and illegal transactions are not registered. Over-estimation can happen when village studies of single sector activities (e.g. firewood) are uncritically scaled up to the national level. For instance, FAO reported for the early 1990s, a high 6% average forestry GDP share in Africa, with 18 countries on the continent even exceeding 10% (FAO 1997). Uganda at the extreme, was supposed to have a forestry share in GDP of 23 % in 1991. Yet, Uganda's Ministry of Finance, as reported by the World Bank, set the forestry GDP share at 1.7% in 1992/93—only one fourteenth of the FAO figure. The latter is probably too low because it is likely that it ignores subsistence uses, but the range of discrepancy shows that much care is needed in evaluating aggregate income data.[27]

As mentioned earlier, international trade in pulp and paper, furniture and other selected forest products is expanding rapidly. Large companies are merging to raise their efficiency within an increasingly competitive marketplace. The increasing foreign direct investment in developing countries indicates that such companies will continue to expand their market shares in the future, especially in the plantations sector (Poschen 2001). In some countries, forestry is a treasured earner of foreign exchange. Total world exports of wood products were worth US$134.7 billion in 1996. Three tropical developing countries have entered the top ten: Indonesia (US$5.2 billion - 3.9%), Malaysia (US$4.2 billion - 3.1%) and Brazil (US$3.2 billion - 2.4%) (Poschen 2001). For Indonesia, a large illegal export makes this figure very conservative. For all developing countries, the average forestry share in GDP is around 2% (with the caveats mentioned above) and its share in developing country exports is almost 3% (World Bank 2001a; Poschen 2001; FAO 1997).

Historically, the forest industry has only reached high GDP shares and contributed heavily to the economic development and poverty reduction of a limited number of countries, such as Finland, Norway, Sweden and Canada. The 1960s had witnessed more optimistic views about general forestry led development in developing countries than were actually realised (Westoby 1962). Westoby later came to recognize that "forest industries have made little or no

contribution to socio-economic development" (Westoby 1978). Instead of an 'engine of growth', the sector sometimes became a drain on domestic resources and hard currencies.

Some researchers have looked to explain the past failure in the inherent characteristics of the timber industry (see top of this section). Others have blamed policies, pointing out that the forest sector often suffers from adverse macroeconomic and sectoral policies. Using Peninsular Malaysia, Ghana and Chile as examples of both successes and failures, Vincent and Binkley (1992) argue that "if the right policies are followed, however, forest based industrialisation can provide an important source of employment and income".

(3) National forestry employment

Employment in timber production generally tends to be less labour intensive than agriculture, manufacturing and services but significantly more labour intensive than oil and mineral extraction. This has importance for the changes between agricultural and forestry land uses: "Where forestry competes with agriculture for land, increases in forest cover lead to large losses of employment per unit area for all but the most extensive forms of agriculture" (Poschen 2001).[28] This would explain why forestry's employment creation and general success has been largest in countries with low agricultural soil potentials.[29]

There are no real 'hard data' on direct forestry employment, but Poschen (1997) attempted some guesstimates of full time job equivalents. For developing countries, he estimated 1.9 million jobs in roundwood harvesting, 0.8 million in reforestation/ silviculture and 13.3 million in fuelwood (the latter is probably overestimated). Outside 'core forestry', a further 3.3 million would be in the formal, and an estimated 16 million in the informal, wood based processing industries. Much of this is part time work involving many individuals. This is often not realised in studies done by "foresters, botanists or ethnologists [who report their results on forestry employment] in terms of people [who are] 'involved in', 'depend on' or 'derive a substantial part of their income from'. They therefore tend to massively overstate the employment provided" (Poschen 1997).

There has been little research on the poverty profile of such forestry employment. A lot of the direct forestry employment is unskilled work with significant health risks in logging camps and sawmills (Poschen 2001). In Indonesia, it is generally held that most employees in logging operations are low skilled outsiders. Young men in particular use this as a strategy to accumulate capital before establishing a household. For these young males, the savings out of logging wages can be an important way to eventually reduce poverty.

(4) Urban forest-product prices

Have poor urban consumers become better off from cheaper forest products, helped along by more efficient production and higher market supplies for forest products? This was the major pro-poor effect in the case of staple foods and the Green Revolution. Unfortunately, while a few non-timber products can be important for the poor (e.g. firewood or medicinal plants), most timber derived products play only a minor role in the consumption basket of poor urban people. High income elasticity makes these products more important for middle income groups and countries—people tend to consume more timber products only as they become richer (Wunder 2001). So, if forest-product consumers have benefited from lower prices, this relates more to the urban middle classes.

(5) Reinvestment of forestry rents outside the forestry sector

Do rich timbers produce large rents that are reallocated to other sectors, where they eventually create employment and income for the poor? Obviously, timber barons do not transfer the totality of their profits to Swiss bank accounts. They are likely to reinvest a significant (though variable) share in promising domestic sectors. They will also consume domestic goods and labour intensive services. Both spending pathways would benefit overall incomes and employment and are likely to cause some 'trickle down' effect to poor people.

Unfortunately, we are not aware of any study that has quantified this process. Nevertheless, it seems obvious that in a timber rich country like Indonesia, some proportion of the billions of dollars of timber rents that have been cashed in since the mid-1960s must have been invested into the rapidly growing urban sectors. In rural areas, there is evidence that some companies investing in oil palm in Indonesia directly depended on the rents from timber to finance clearing and planting. Both types of investment must have stimulated national economic growth over the last three decades, thus probably also helping to reduce the number of people living below the poverty line.

In terms of general linkages and 'multiplier effects', Poschen (2001) reviews studies from developed countries, showing that for every forestry job normally created there, an extra 1.0-1.4 jobs outside the sector were also created—the full estimate range was 0.5-3.2. Currently, no developing country studies of this type are available.

4.3.4 Summary on pro-poor timber benefits

The high rents from previous timber species have conventionally been regarded as falling exclusively into the laps of the rich. Images of chainsaws and large trucks destroying the forest and jeopardising poor forest dwellers' livelihoods are based on many real experiences. Some imminent characteristics of trees as assets and of the timber production process, in extractive or planted systems, prove to be 'anti-poor'. Timber requires capital, skills, land tenure, technology, production systems and time horizons that poor people fail to deliver. The causes behind this lie deeper than general injustice of power—putting the timber in the hands of the poor may make it worth much less.

Yet this is only part of the story about the current impacts of timber extraction on poor people. In some cases, there may be important indirect benefits from industrial operations, particularly local development impacts (e.g. road building) and the reinvestment of timber profits into other sectors of the economy. Millions of small enterprises and poor households also benefit directly from extracting timber from natural (including secondary) forests and from planting their own trees, and the number of smallholders deriving these timber benefits seems to be on the rise. A number of recent changes in technology, markets and institutional frameworks (including control over forestland) favour this trend. We have discussed three paths that appear promising not only for poverty prevention but also for poverty reduction: increased local control over natural forests, smallholder tree growing (e.g. outgrower schemes) and small scale, wood based enterprises.

Note that some activities based on low rent, high quantity timbers (i.e. ordinary, lower valued species) face dilemmas similar to those of NTFPs. Again, it is necessary to distinguish between different product types (Arnold and Townson 1998). Some low value wood products are inferior and tend to disappear over time and with higher incomes (e.g. some wooden agricultural tools). Others have a positive but small income elasticity (e.g. furniture and woodcarvings) and a third group faces expanding but fluctuating exports markets (e.g. pulp and paper). On the positive side, the general market outlook for these low value timbers may still be better than for most NTFPs.

4.4 Payments for ecological services

4.4.1 What link to poverty?

Forests can provide important services both to local *on-site* forest dwellers (e.g. clean drinking water) and *off-site* beneficiaries, such as regional users (e.g. downstream water benefits), national consumers (e.g. urban tourists) or global stakeholders (e.g. valuing the existence of endemic biodiversity). Probably the highest poverty *reduction potential* is through payments for the *off-site* benefits enjoyed at the regional, national or global levels. Currently, most off-site beneficiaries are 'free-riding'—they don't pay for what they get. Hence, a poor forest community that owns a forest has no incentive to take this service provision actively into account in its land use decisions. This means that when land becomes scarce and is increasingly put to the locally most rewarding use, the off-site service may be lost. When land use changes begin to threaten these services or supplies (e.g. soil erosion polluting drinking water), free-riding beneficiaries may eventually be willing to pay forest owners and users to protect the service. By rewarding those who bear the opportunity costs of not 'developing' their forestlands, both service providers and off-site beneficiaries can gain. It seems to be one of the few widely applicable 'win-win' options between forest conservation and poverty reduction.

Compensation mechanisms are relevant in at least four forest related areas, examined in greater detail below: (1) carbon storage and sequestration; (2) biodiversity conservation; (3) hydrological services; and (4) tourism. We also need to make another subtle distinction. In some cases, we have payments for *safeguarding* against land use changes that threaten to jeopardise current service provisions (e.g. preventing deforestation that would cause additional carbon emissions). In other cases, users would pay for the explicit *creation* of forest services, be that for *recuperating* a lost service (e.g. reforestation to sequestrate carbon) or for *new* services (e.g. carbon motivated afforestation of grasslands).

Payment for ecological services is an emerging area with high growth potential and opportunities for poor forest stewards, but uncertainties exist regarding how much the poor will benefit. Villagers in the Transkei, along South Africa's 'Wild Coast', discuss forest management with CIFOR researchers. (Photo by Sven Wunder)

Payments of the avoidance type anticipate a counterfactual baseline scenario of forest-service deterioration—if no payment is made, things are supposed to get worse. This implies that service buyers often (though not always) pay service providers for preserving the *status quo*, rather than deteriorating the service.[30] In turn, forest-service *creation* payments are made for improvements against the baseline of the *status quo*.[31]

The following example serves to illustrate some general opportunities and challenges for service compensations. A downstream user of drinking water is concerned about deteriorating water quality. The user considers paying an upstream forest owner to stop his ongoing forest conversion of an erosion prone plot (safeguarding) and perhaps even to replant trees in areas already affected by past clearing (recuperation). For a payment scheme between the two to emerge and become effective, several 'nuts and bolts' have to be in place. Three basic prerequisites are essential for the incentive mechanism to work:

(1) The downstream user (the potential service buyer) must be aware and convinced of the *existence of an externality*. In other words, they must believe that the potential service provider (the upstream forest owner) truly affects downstream water quality through their land use decisions and that the direction and size of that impact are clear.

(2) The downstream user only wants to implement a payment if it is likely to be *effective* in achieving land use change that improves water quality (or alternatively, avoids a land use change in order to maintain water quality). Otherwise, the money would be wasted. This elevates the importance of *monitoring* compliance. It also requires the upstream forest owner to effectively *control* land use, if not through secure private tenure then at least through the right to *exclude* others from affecting incompatible land use changes.

(3) The downstream user will not want to pay for the conservation of a forest plot that was in any case too remote, too unfertile or otherwise unattractive for the upstream forest owner to clear. In other words, when the *opportunity cost* of conservation is actually (perceived to be) zero, there is no basis for payment. If there is no *credible threat* to the continued provision of the service, the buyer's rationale for compensation vanishes.

Specifically to the first point, there is sometimes limited biophysical 'proof' of the existence of positive forest externalities, compared to alternative types of land use and vegetation cover. This is particularly true for the ongoing controversy concerning forests and hydrological services. A key question is always: what alternative land use(s) can one compare forests with? Some converted uses can perform a range of ecological services that are similar to those that forests provide, (e.g. perennial crops or home gardens). In fact, some uses can even *improve* specific desired services (e.g. creating greater water runoff). Others, such as the conservation of endemic biodiversity, are unambiguously linked to the preservation of natural forest cover and quality.

What poverty reduction potentials do we expect that a spread of forest-service payments will offer on a global scale? Firstly, one should keep in mind that the prime objective of these payment schemes will *never* be to make poor people better off. Service markets and compensation agreements emerge due to demand-side pressures, driven by growing shortages and predictably, by influential actors reacting to them.

For payments to have a lasting positive impact on poor people, be that as a mere by-product to conservation-maximising schemes or as an explicitly addressed secondary objective, it is a *sine qua non* that the schemes are actually effective in providing the forest services. A strict efficiency requirement is something that distinguishes payments through forestry aid projects, from other 'soft', altruistically inclined donor interventions. If the scheme fails to deliver the services, no responsible service buyer would want to continue paying for it.

A concern has been raised that such payments are just another example of rich people in the Northern Hemisphere setting an agenda to the detriment of the legitimate development aspirations of poor forest dwellers in the South. We believe that this is a wrong perception, simply because service-compensation schemes as a rule are voluntary *quid pro quo* agreements, offering an additional income source to poor households, which they may or may not accept. In the simple watershed example above, a poor forest owner would only wish to enter into an agreement if the net compensation was higher than what they would lose by foregoing the best alternative land use options.

The greater the *willingness to pay* on behalf of the recipients, the more likely that these transfers will eventually make the forest-service providers better off. Obviously, the service buyer will look for 'the biggest (service) bang for their buck' so to speak, while the provider will want to minimise adjustments to their planned first-best land use without the transfer. However, this conflict of interest is no different to that between any buyer and seller of forest products or indeed any suppliers and consumers within any market. The *gains from trade* should still make both service providers and users better off, unless special coercive scenarios come into play (see discussion below). What is the alternative? Clearly, we cannot expect the poor to continue providing these services for free when it conflicts with their own interests.

Finally, we should remember that not all the off-site service recipients are rich. There are poor people among downstream farmers, urban water users and global beneficiaries. These impoverished service recipients may not be able or willing to pay but they may free-ride on other users' payments and thus benefit from the mitigation of environmental problems 'gratis'. Global warming for instance, is expected to hit poor people in tropical countries especially hard because of the potentially greater water shortages, declining crop yields and exposure to diseases—and the limited means of the poor to adjust to these threats (IPCC 2000). In this sense, a poverty aspect is equally present on the forest-service demand side.

4.4.2 Carbon storage and sequestration

Forestry projects that store or sequester carbon can receive technological and financial transfers under the Clean Development Mechanism (CDM) of the Kyoto Protocol. Carbon services from forests relate to the planting of new trees to sequester additional carbon from the atmosphere (service creation) and to forest and tree carbon storage in areas that would otherwise have been cleared (safeguarding). Yet, in July 2001, at the 6th session of the United Nations Framework Convention on Climate Change (UNFCCC) in Bonn, forestry activities under CDM were limited to reforestation and afforestation and activities to reduce deforestation were *not* included.

Still, private sector Joint Implementation (JI) schemes outside the CDM, as well as the newly founded BioCarbon Fund,[32] have not taken the same rigorous stand against the eligibility of 'avoided deforestation'. Uncertainties about the

future implementation of the protocol range from doubts about its adoption to the prospective role of Land Use, Land Use Change and Forestry (LULUCF) in CDM. Various methodological and measurement problems relate to the effects of forestry activities on the carbon balance, including additionality (establishment of a quantitative baseline of 'counterfactual' carbon release without mitigation measures), duration, project boundaries and leakage effects (see IPCC (2000) for an overview).

Carbon related services and commodities differ from the other forest services in respects that also have poverty implications. Forestry related carbon storage and sequestration competes with a number of alternative mitigation mechanisms. Actually, it has been argued that the alternatives are likely to be more cost efficient than forestry (Smith *et al.* 2000) but this remains controversial and awaits better empirical analysis. Carbon storage is also not site-specific—it does not matter where on the globe mitigation takes place. There are no threshold effects or inevitable requirements for collective coordination (see below). This high flexibility, homogeneity and substitutability will eventually favour the emergence of more sophisticated global markets, with many agents and a high degree of competition.

Arguably, this growing maturity of carbon markets is unfavourable to poor suppliers because their comparative disadvantages will be fully exposed. On the positive side, the *sheer size and economic potential* of the carbon market currently appear larger than for any of the other three areas for compensation mechanisms (i.e. relating to biodiversity conservation, hydrological services and tourism). Even a small market share for poor people's carbon forestry can be an important contribution to poverty reduction.

The number of carbon-offset schemes is growing rapidly. Bass *et al.* (2000) review 30 such schemes, while Landell-Mills and Porras (2002) found 75 forestry related carbon schemes for their review, of which 42 are in the three tropical continents (Latin America 24, Asia Pacific 13 and Africa 5). Most of these projects are in their early stages, so the long term effects on rural livelihoods and poverty reduction are not yet known. Smith and Scherr (2002) discuss extensively the livelihood potential of forest carbon projects. A dozen studies estimate the costs of various carbon sequestration projects. They appear to have the largest potential where the opportunity costs of labour and land are low and the demand for forest products is high. Unfortunately, these two enabling characteristics tend to be negatively correlated in space (that is, low-population *vs.* high-population density areas).

Amongst different types of projects, Smith and Scherr note that assisted natural regeneration tends to be cheaper than tree planting and recommend its inclusion into the CDM. Averted deforestation, currently not CDM-eligible, generally provides more diverse livelihood benefits than tree planting. A major uncertainty is the price of carbon itself. Without the participation of the United States and with surplus emissions from Eastern Europe being put on the market, the carbon price could be very low and could make many pro-poor projects uneconomical. It would take specific interventions to reduce the high transaction costs of implementing projects with smallholders.

4.4.3 Biodiversity conservation

Since the 1970s, many new protected areas have been established in tropical countries. Still, as land becomes scarce, there is often resistance against areas being set aside purely for conservation, restricting previous uses and/or relocating people. This resistance can come both from local residents and national governments. Local people want alternative income sources in return and politicians usually want 'expansion zones' into which they can channel population-led and market-led demand for new land.

Integrated Conservation and Development Projects (ICDPs) represent one attempt to bridge these interests. Since the early 1980s, this has been a dominant approach to biodiversity conservation. Unfortunately, most ICDPs have been relatively unsuccessful in achieving conservation goals and due to complex project structures and large administrative costs, they also tend to be too expensive in reaching their development objectives.[33] There has been "growing realisation that ICDPs have run the risk of contributing effectively neither to conservation nor to development. The result is a big gap between rhetoric and reality" (Sayer *et al.* 2000).[34] The key underlying assumption has been that providing alternative employment (e.g. small scale enterprises) or raising incomes from land already in use (e.g. through improved agricultural technologies) should dampen the pressure on forests through 'conservation by distraction'. Unfortunately, these interventions do not necessarily reduce either the *incentives*

for, nor the *means* of, forest encroachment. In fact, the opposite might well be the case.[35]

One alternative incentive based approach is to encourage producers to adopt biodiversity friendly methods (e.g. shade-grown coffee) and sell their certified products to environmentally conscious (predominantly developed country) consumers, who are willing to reward producers through a price premium. The premium can be seen as a payment for biodiversity, though increased prices could in principle, also induce producers to convert more forests to (albeit biodiversity friendly) agriculture. There is some evidence from Central America that this type of certification arrangement can also be targeted to (and benefit) poor producers (Pagiola and Ruthenberg 2002).

A third option is to compensate people directly for conservation, that is, for setting aside areas for forest conservation that would otherwise have been cleared, logged and/or exploited in a way that implies biodiversity losses. Compensations can take the form of so called *conservation concessions* (payments made typically to governments in lieu of logging concession payments) or *conservation easements* (payments made directly to landowners for not converting forests to alternative uses). In both cases, conservation performance needs to be monitored so that payments can be halted in the case of non-compliance.

Direct incentives are still in a pioneer phase of application in the tropics (Ferraro 2000, 2002; Hardner and Rice 2002; CIC 2000). Conservation International and other major conservation players have put a lot of effort into conservation concessions as an alternative to timber concessions. That is, paying an up front amount and an annuity to a tropical country's forest service for areas *not* to be logged, thus entering into direct competition with logging companies.

A challenge here is how to develop the concessions in a way that makes local people better off and provides payments that mimic other income flows. Another challenge is how to promote not just concessions but also conservation easements in the tropics. In most places, agricultural conversion is eventually a larger threat to tropical forests than logging. The per hectare opportunity costs of conservation in agricultural expansion zones are higher than for remote forests that would be logged without subsequent conversion.[36] In many situations, one would need to compensate and monitor a myriad of smallholders with weak property rights over their land, which is much more cumbersome and costly than paying the government. On the other hand, direct payments to smallholders on the ground would be likely to have a larger poverty reduction impact than paying the forest agency in the capital for abstaining from logging.

4.4.4 Hydrological benefits

Hydrological forest services can be related to the quality, quantity and timing of water flows. Although we know that forests are important for some hydrological services, the exact linkages between various tropical forest types and different hydrological services are not easy to document (Bruijnzel 1990). Calder (1998) lists proposed forest benefits as higher rainfall, greater runoff, regulated flow, less erosion, less flood hazard and higher water quality. But each of these is contentious and highly site-specific and scale-specific and they depend crucially on what land use alternatives one compares them with. There is evidence that foresters and conservationists have over-estimated the hydrological benefits of forests, except perhaps for the case of drinking water supplies, where forest cover seems to be unambiguously desirable for a high quality product (Chomitz and Kumari 1998; Bishop and Landell-Mills 2002).

These scientific uncertainties have not impeded the incipient implementation of payment schemes to upstream forest owners, mainly in Latin America. Experiments in Colombia, Costa Rica and Ecuador have involved payments from beneficiaries such as hydroelectric power plants, drinking water consumers and users of irrigated water (Pagiola 2001). Fisheries represent another sector that may be detrimentally affected by the deterioration of water quality. For instance, in one of the first total economic value studies, carried out in Korup National Park in Cameroon, Ruitenbeek (1988) found that forest protection of downstream coastal fisheries was one of the largest forest conservation economic benefits in the park, compared to a scenario of continued deforestation. It is likely that growing global water shortages will significantly increase the scope of payment schemes in the coming decades.

Payments for water services have often been combined with biodiversity conservation payments (see previous section) but as yet there have been few assessments of the welfare implications. As an example, Brazil has, in several federal states, implemented an

Ecological VAT, where heavily forested municipalities are tax-rewarded for their water and recreation services (Grieg-Gran 2000; May *et al.* 2002). The pay off has been an additional share of (Value Added Tax) VAT tax revenues, based on regular monitoring of forest size and quality. In terms of poverty, this payment often implies redistribution from rich and developed to poor, under-developed municipalities that have not yet converted their forest areas to other land uses. One can only speculate to what extent this redistribution from rich to poor also trickles down to poor households.

A recent global review of 61 watershed payment schemes concluded that their overall poverty reduction impact was likely to be positive, that the effect was generally neglected in evaluations and that it was likely to depend much on the bargaining power of communities. Poor people were often disadvantaged in cases where they had to compete for the water service provision with other users whose coordination/ transaction costs were lower (Landell-Mills and Porras 2002).

4.4.5 Forest-based tourism

Tourism is one of the world's largest and fastest growing industries and eco-tourism and forest based tourism are highly dynamic segments within this sector. For international high class eco-tourism, open areas with a high frequency and good visibility of charismatic mammal species, such as the savannahs in Southern and Eastern Africa and the Galápagos islands in Ecuador, have done particularly well. But tropical forests have also occupied an important niche.

A country like Costa Rica, in spite of a history of accelerated deforestation, has been able to promote an eco-tourism concept based on a well functioning protected area system. This has made the tourism sector the principal source of foreign exchange in that country. Generally, tourism can make use of high quality forests in a fragmented landscape with good infrastructure, rather than needing large and remote frontier forests. The type of biodiversity and scenic beauty that tourists demand is not necessarily the same as that protected in conservation concessions (see above). While there is a clear upwards trend in global economic revenues from tourism, the downside is that international tourism is highly sensitive to security problems (including the more recent fear of international terrorism) and political turmoil, which in politically unstable countries causes large fluctuations in tourism incomes.

To what extent does forest based tourism help to reduce the poverty of forest dwellers? Tourism differs from the three other forest-service cases in the sense that it provides not only off-site 'externalities', it also triggers local cash flows related to tourists' on-site expenditure on tourism goods and services. The latter are usually also intensive in the employment of unskilled and semi-skilled labour (e.g. for services in hotels, restaurants and in the provision of transport, etc.), which can favour the poor. In other words, the hedonic value of forests and protected areas attracts tourists and triggers other expenses that stimulate the local economy. This is an important indirect factor. Moreover, an increasing number of tour companies also pay direct fees to local communities for the right to continuously access a locally controlled natural site—which may entail them giving up or restricting certain forest uses that are less compatible with the tourism operation (e.g. timber extraction and hunting).

Unfortunately, many case study assessments of local impacts have focused one-sidedly either on perceived cultural distortions or on the *relative* distribution of tourism income, stating the somewhat self-evident conclusion that tourism companies tend to reap the bulk of profits from luxury operations. Yet, even a minor local participation in high tourism revenues can significantly raise the absolute household incomes of poor people *and* provide efficient conservation incentives.

Evidence from many parts of the world suggests that it is possible to design nature based tourism operations in a way that significantly benefits local people. This includes the classical CAMPFIRE project in Southern Africa (The Zimbabwe Trust *et al.* 1994), the Annapurna Conservation Area Project in Nepal (Gurung and Coursey 1994) and community benefits in Belize (Lindberg and Enríquez 1994). This also holds for company-run international eco-tourism operations in Ecuador (Wunder 1999) or national tourism by urban backpackers into forest recreation areas in Brazil (Wunder 2000). Regrettably, the economic potential for local income generation from this variety of institutional arrangement is still widely ignored.

4.4.6 Can forest-service payments reduce poverty?

In summary, there is some ground for optimism that forest-service payments can help to reduce rural poverty. Not only do these payments offer

an additional flow of income, such flows also tend to be more stable over time than the ones they are designed to substitute (e.g. the fluctuating prices of timber and cash crops) (Hardner and Rice 2002). In addition, the introduction of payments can also help induce a series of indirect benefits, follow up investments and external assistance (such as training, improved community organisation, better knowledge about forest management, improved environmental quality, better understanding about urban markets for other products, etc) (Landell-Mills and Porras 2002). Finally, international markets for ecological services provide a mechanism for long term investment flows from the North to the South. Even in the extreme case that all the direct payment recipients are larger landholders, the transfer could eventually provide indirect benefits that trickle down to the poor (see discussion on logging rents, Section 4).

A key question is: To what extent will poor people be able to compete in the emerging service markets? The two main comparative disadvantages of the poor are their insecure land tenure and the high transaction costs and risks of interacting with them. Both may lead potential service buyers to look for cheaper and less risky providers of the same services. Large start up costs and long term, inflexible land use commitments can be additional constraints for poor people (Pagiola *et al.* 2002).

Paradoxically, these disadvantages become more evident with the more mature and sophisticated markets. In the carbon market, for instance, buyers can choose more and more flexibly between sectors, sites and types of suppliers. This high transparency and substitutability make it difficult for the poor to compete. The same holds true for certain 'green' certified products with *embodied* eco-services. These can be supplied worldwide by rich and poor producers alike, unless it is an additional certification attribute that part of the extra profits go to poor people.

On the other hand, if the buyer's clear objective is to protect a specific watershed or a unique high endemism area, there is no other choice than to deal with the people who happen to live there—even when they are scattered, disadvantaged and disorganised and have overlapping land claims. Services that depend essentially on *collective action* (e.g. in watershed protection) or on size specific *thresholds* (e.g. for a biodiversity corridor) can also have a pro-poor effect because the poor necessarily have to be integrated for the service to be provided effectively.[37]

As mentioned previously, even in those cases where poor people are completely bypassed as providers of remunerated environmental services, there is little to sustain the claim that they would be made *worse off*, due to the voluntary character of the schemes. This could only occur where coercive forces come into play. For instance, one could imagine cases where increased forestland values induce more powerful actors to expel poor people from forests. On the other hand, there are also examples of payment schemes helping to *consolidate* the informal land rights of poor people. Thus, much depends on the relative power of the specific actors and on the selection of the institutional set up, perhaps the main factor to keep in mind for donor interventions.

4.5 Summary

To what extent can forests help to alleviate poverty—that is, to prevent poor people from further deprivation or to reduce poverty?

- It is well documented that forests serve as *safety nets* for rural households, which include periodic food buffer functions and insurance values in emergencies. Extensive deforestation endangers forest safety nets and potentially increases extreme poverty.
- The *static* role of forest safety nets is thus widely acknowledged but controversy surrounds their *dynamic* role. To what extent are other assets or diversified cash income sources (e.g. cattle or off-farm employment) replacing forest based safety nets over time? Are forest based safety nets only a transition stage? Are we simply failing to see the new safety nets 'for the trees'? At what opportunity cost should forest based safety nets be maintained? Are there ways to reduce the risks and fluctuations that made rural people build safety nets in the first place, so that they can specialise more in those activities that yield the highest return? When forest based safety nets are truly 'dynamically competitive', how could research and other external interventions possibly help to enhance them—other than by simply advocating forest conservation?
- Efforts to increase the incomes from NTFPs have generally not delivered what

many had hoped for a decade ago. In most cases, NTFPs provide an 'employment of last resort,' with marginal economic returns. Still, when no alternatives exist, NTFPs provide a vital supplementary income that helps poor people cope, both in terms of their subsistence uses and potential for cash income. Some high value NTFPs can contribute a significant amount of cash and households may specialise in their extraction and managed production. In other cases, demand is rising but the resource is being mined and hence the site specific benefits are transitory.

- Some wood products (e.g. firewood and low value timbers) have characteristics that are similar to the bulk of non-wood forest products. Hence, as Arnold and Townson (1998) conclude for eastern and southern Africa, "much household and artisanal involvement in production and trading of forest products is in labour-intensive, low-return, activities associated with poor, stagnant rural economic conditions." Regarding the policy options for poverty reduction, in these 'last resort' cases, "[I]t may therefore be more fruitful to help people move into other more rewarding fields of endeavour rather than seeking to raise their productivity in their current line of work" (*ibid*).
- Logging and the timber industry have traditionally yielded small direct benefits to the poor, due both to anti-poor policies and certain production characteristics. The indirect benefits in terms of local employment and multiplier effects are in some cases more significant but few studies have quantified these. There is a marked tendency in the forest literature to ignore economy wide trickle down effects, including the effect of forest rents that flow into other, faster growing sectors.
- In spite of negative preconditions, new trends with respect to markets, technologies and institutions provide a potential for raising small scale timber production, both from natural forests, small scale plantations and a multitude of intermediate systems producing trees. In some cases, these opportunities raise trade offs between income and forest conservation, between commercialisation and safety nets and between the moderately and the very poor households' interests.
- In spite of the constraints relating to the weak land tenure of poor people and the high transaction costs of making agreements with them, the emerging markets for forest services will provide new opportunities for poor forest stewards in four areas: carbon, biodiversity, water and tourism. Explicit efforts to design compensation schemes and institutional frameworks in a pro-poor manner can help poor people to effectively compete in these markets with larger landholders.

5. Future Research on Forests and Poverty

Additional and better research can guide decisions that help to safeguard or increase the benefits poor people receive from forests. Research has already yielded key insights in some areas, for example, by pointing to fields where forests are *not* providing a significant means to reduce poverty and highlighting major obstacles that are preventing forests from playing a bigger role in poverty reduction. However, a large number of questions remain unanswered. As a general observation, there has been a lot of research done on NTFPs over the past 10 -15 years, while studies on how to measure and increase timber benefits to the poor remain scarce. Research on ecological service payments has only recently started to build up, as markets for these services gradually develop.

In this section, we discuss and suggest some topics for further work on the forest-poverty link. In Table 2, we put forward ten topics where we believe research would be particularly valuable—and of either a medium or high priority. While the selection and prioritisation have been influenced by discussions at CIFOR over the past couple of years, we realise that such a list is ultimately bound to be of a subjective nature. We group the topics into three categories and cross tabulate them with research methods. The first category is all about how to better assess current forest based benefits for the poor. The second category explores emerging market opportunities, while the third covers cross-cutting institutional and extra-sectoral issues.

Table 2. Poverty-Related Forest Research—Topics, Research Methods and Priorities

Research area	Topic	Priority	Preferred research methods			
			Analytical & conceptual models	Literature review & synthesis[38]	Secondary data analysis	Primary data collection & analysis
I. Exploring the present pro-poor role of forests	(1) Forest products (subsistence & income) in household livelihood strategies—safety nets and increased welfare	High	X	X	X	X
	(2) Small scale wood based processing enterprises	High		X	X	X
	(3) Economy-wide benefits of forest based rents	Medium	X	X	X	
	(4) *On-site* ecological services from forests and trees	Medium		X		X
II. Emerging market trends and opportunities	(5) Globalisation, trade liberalisation and markets	High	X	X	X	
	(6) Smallholder tree planting and private sector partnerships	High		X	X	X
	(7) Payments for environmental services	High	X	X		X
III. Cross-cutting institutional and extra-sectoral issues	(8) Local resource control and land tenure	Medium	X	X	X	X
	(9) Decentralisation, governance and market deregulation	Medium	X	X		X
	(10) Integrating forests into macroeconomic and poverty strategies	Medium		X		X

5.1 Research area I: Exploring the present pro-poor role of forests

Many readers may be surprised to see Topic 1 as a high priority item on our list. After all, numerous forest valuation studies have already been done over the last decade. Unfortunately, their scientific quality and policy impact have been variable and the *de facto* correlation between quality and impact has probably been negative: Some of the most rudimentary valuation studies with heroic assumptions and simplistic conclusions have actually had the greatest influence on the international debate (Sheil and Wunder 2002). Also, the existing studies have focussed too much on per hectare values, where a better understanding of the role in the household economy would have been needed. Rigorous quantitative studies of the type done by Cavendish (2000, 2002), Fisher (2002) or Campbell *et al.* (2002) are only recent and still very rare.[39] There is also a lack of studies shedding light on household behaviour with respect to forest products (Mike Arnold, pers. e-comm., 6 Nov 2001).

One idea that CIFOR is currently pursuing is the prospect of working with a number of universities on coordinated outlines for PhD theses, using an *ex ante* agreed upon methodology (e.g. Campbell and Luckert 2002 and elements from the above mentioned

Future research on both the poverty prevention/safety net role of forests and on their potential for monetary income generation and poverty reduction will help guide decisions to safeguard or increase the benefits for poor people (like these villagers in Kalimantan, Indonesia). (Photo by Christian Cossalter)

studies) to produce comparable data from different regions and ecosystems. Forest safety net functions should also be included in this framework—preferably integrating quantitative, formalised techniques, such as in Pattanayak and Sills (2001), and providing answers to some of the questions about safety net dynamics raised in Section 4. Only with solid evidence in hand about how forests contribute to the livelihoods of rural households can one convince policy makers and development planners that forests need to be considered in this light (see below).

The second theme in Table 2 (small scale forest enterprises) has been studied in some countries, especially in the dry forest regions of Africa (cf. Section 4). However, we currently lack additional studies from humid areas to determine whether employment generation from forest SSEs is just as important in other regions and ecosystems of the world. Small scale forest enterprises have a long tradition and provide significant employment in rural areas. Yet, attempts to expand these, including experiences of NTFP commercialisation, have shown mixed results. Both Arnold (2001) and Scherr *et al.* (2001) indicate that policies and external interventions are partly to blame. For example, they have focused too much on access to raw material, rather than on marketing, markets and matching demand and supply. The enterprise approach is generally under-represented in the forest product literature. A major recommendation is to link future research to the work on small scale rural enterprises, for instance, as done by the International Food Policy Research Institute (IFPRI) (e.g. Haggblade *et al.* 2002).

The basis of Topic 3, researching the economy wide benefits of forest based rents and timber rents in particular, is undoubtedly a difficult task. However, for a handful of countries with very high timber export revenues (e.g. in Southeast Asia and Central Africa), some effort in that respect would be very worthwhile. Research could also be done on local economies (e.g. how do Mexican community forestry enterprises reinvest their profits?), including for example, non-timber forest rents (e.g. how do Asian eaglewood and bird's nest collectors use their proceeds?). Overriding research questions include: How large are the forest based rents *vis-à-vis* the rest of the (local or national) economy? How much is reinvested and how much is consumed? Approximately what proportion stays in the (local or national) economy and what proportion is taken out (e.g. to the capital or to Swiss bank accounts)? Does the bulk of reinvestment remain in forestry/forested

areas—and if not, why not? What are the welfare and development implications?

The subject of Topic 4, ecological *on-site* benefits from forests and trees, is best seen as an integral part of the *safety net* function of forests (see Topic 1). This can probably best be researched in connection with the poverty prevention functions that products from standing forests provide, with the protection benefits from keeping trees in increasingly converted landscapes (e.g. in agroforestry) and with the restoration benefits from planting trees in degraded landscapes. Especially for natural forests, we know very little about these services and their relation to changing land uses. A caveat here relates to how much the results of such studies can be generalised and what this means for the cost effectiveness of research.

As mentioned in Section 4.4, regarding off-site ecological services such as hydrological protection, these forest functions can often be very site specific. For example, if it takes three years of solid research to find out whether a village's ongoing forest conversion to cropland endangers drinking water quality and quantity, if the total cost of that research could pay for the purchase of drinking water corresponding to 20 years of village consumption and if the results are irrelevant to any other village than the one studied, then the research project was probably not justified in the first place.

5.2 Research area II: Emerging markets and opportunities

The second research area deals with new trends in markets and economies, which provide both new opportunities and challenges. The fact that we rank all three topics under this heading as high priority reflects our belief that structural changes in the marketplace often assume a decisive role for livelihoods.

'Globalisation' (Topic 5) has been the over-arching buzzword to describe a number of worldwide processes, including trade liberalisation and the revolution in communication systems that has facilitated an extensive flow of information. These processes can certainly provide new economic opportunities, in terms of improved access to international markets and a greater openness of economies. They can also open up certain *niche markets*, such as certified premiums for desirable production characteristics of commodities. This refers mainly to ecological sustainability but sometimes also to poverty dimensions, such as 'fair trade' certified commodities, where small primary producers receive a higher than normal price.

On the flip side, globalisation also brings new threats to smallholders. For instance, they may not be well equipped to compete in 'green' certified markets, or the import liberalisation of forest products in previously closed economies may out compete small national producers (e.g. this seems to happen in Mexico). Expanding sectors might be subject to economies of scale, so that larger businesses out compete smallholders. More trade can also lead to over harvesting of forest resources, depriving poor people of their access to subsistence uses and small scale commercialisation.

If they do succeed in competing, small producers can become more vulnerable due to fluctuations in the global economy. Thus globalisation provides both opportunities and threats for the poor and their forests. Which of these effects dominate is an empirical question and further research can help to enlighten policies that could influence these processes in favour of the poor.

Smallholder tree planting (Topic 6) will expand in the future in those areas where wood supplies from natural forests are decreasing and where, at the same time, smallholders control a significant share of the land. This trend is fairly advanced in Asia and much effort (including large credit programmes by the World Bank) has gone into small scale plantations. Yet the most important cases of small scale tree planting—in China and India—remain poorly documented in the literature. Learning from these experiences would be strategic.

Partnerships such as outgrower schemes are also set to further increase. Due to what we termed 'anti-poor timber features' in Section 4, we believe that partnerships can in many cases, present more realistic options than the poor 'going it alone' in timber production and marketing. Well designed partnerships can reduce the potential for conflict. As noted by Desmond and Race (2001), governments or NGOs rarely play the role of matchmakers. This suggests that researchers should preferably be working directly with the partners. Concepts such as Adaptive Collaborative Management (ACM) may provide useful techniques for future research.

Topic 7, payment for environmental services, is a strong research candidate with similar characteristics. Service markets are growing rapidly, previous research has been limited, antagonistic viewpoints abound in the debate and the potential benefits of reconciling them are considerable. As for outgrower schemes, a main difficulty is in 'marrying' poor people that are weakly organised and have insecure property rights, with more influential and resourceful outsiders looking for the efficient and continuous provision of forest or tree based benefits. If the marriage fails, both parties may suffer but poor people seem to have more to lose if they are left out of these emerging markets. Research can help to design and recommend institutional arrangements that can help arrange the marriage in the first place and reduce the probability of future divorce.

5.3 Research area III: Cross-cutting institutional and extra-sectoral issues

It would seem common sense that full control over land and forest resources by poor local people and communities must be a key precondition for improving their lot. The recent literature on the *devolution* of property and use rights to local communities does not directly contradict common sense but it does raise some doubts about how direct this link is. Much depends upon the extent to which framework conditions (internal organisation, government policies, market access, etc.) allow poor people to make their own assets productive. In many cases, it takes time to judge whether these processes are successful or not and to define what determines their outcome. Countries where local communities have owned their forests for a long time, such as Mexico (75% of forests owned by the *ejidos*) or Papua New Guinea (99% of forests owned by communities), offer good opportunities to study 'what works and what doesn't' in the long run for forests and (poor) people (Topic 8).

A linked set of factors concerns institutional and policy issues, such as decentralisation, governance and market deregulation (Topic 9). Decentralisation should provide pro-poor opportunities but some experiences imply that when budget allocations to local authorities are insufficient or when local elites come to monopolise power, the net outcome for the poor can be negative. Improved legislation is often decisively hampered on the ground by implementation obstacles, including corruption. Few studies have dealt with the financial incentives of forest agencies—they often act as their own profit maximisers, which seldom leads to wise management of the resource.

Despite widespread economic liberalisation in general, many developing countries still have an amazing amount of forest sector prohibitions and market regulations. Often these regulations deprive local people of the right to harvest the trees on their own land, thus also opening up niches for local level corruption. In a FAO forum studying six countries, the issues of deregulation and de-bureaucratisation came out as priority action areas in all cases.[40]

One example of anti-poor regulations is the technical requirement for forest management plans to be prepared by a professional forester, which is beyond the financial reach of smallholders. The policy barriers to participation in forest product markets are formidable (Scherr *et al.* 2001). Instead of creating an enabling environment for local forest enterprises, policies create monopolies or oligopolies and protect vested interests. We need a better understanding of these political processes and the points of leverage for change.

Finally, in macro-level poverty literature and policy making (see Section 3), generally little recognition is given to the role of forests (topic 10). This leads to normative statements such as: "The forests … can—and must—take a far greater role in meeting the UN Millennium Summit target of halving extreme poverty by 2015" (World Bank, 2001). Yet in the World Bank promoted Poverty Reduction Strategy Papers (PRSPs), only limited attention is given to environmental and forestry issues. This also indicates inconsistencies in the World Bank's sector policies.[41] One way of resolving the debate would be for the 'forest lobby' of foresters and conservationists (and their suite of NGO activists, consultants and researchers) to convince the hard core economists, policy makers and development planners that they have come to 'forget' an important sector.

The other extreme would be for the forest lobby to recognise, after a closer look, that 'their' sector was actually just as marginal to national poverty alleviation as the hard core developers had implicitly stated by ignoring forests. The latter extreme seems unlikely as forests probably have *some* role in poverty

alleviation—though often more in its prevention than its reduction, as we have argued in this paper. There is scope for integrating forest issues into poverty concerns (particularly national poverty reduction strategies) and *vice versa*, for example, into National Forest Programmes (NFPs). Where exactly in between the two extremes the debate will eventually settle is an open question, depending on the specific country situation and notably, on what research and practical experiences the previous nine topics reveal.

Endnotes

[1] Both authors participated in FAO's forum, "The Role of Forestry in Poverty Alleviation", held 4-8 September 2001, in Cortevecchia, Italy and both contributed to FAO's policy brief (FAO 2001).

[2] According to Webster's Dictionary (1993), '*capital*' is defined as: "A stock of accumulated goods…devoted to the production of other goods…in contrast to income received". For physical, financial, human and perhaps also natural capital, that would normally make sense. But even with a lot of good will, it seems futile to try to construct a concept of 'cultural capital' or 'political capital' that has any relation to the original meaning of the word.

[3] Even dimensions like 'power' can be measured quantitatively. For example, the number of non-related guests that attend a family's wedding or funeral can be taken as an indicator of that family's power (M. Zeller, pers. e-comm., 18 Feb 2002). The difficulty here seems to be more in developing consistent and comparable measures at larger scales.

[4] In addition, a number of more personalised norm-deviation factors also trigger a significantly higher average probability of unhappiness: divorce or separation, having more than three children or belonging to a generation with 'boom-age' parents and thus easily developing unrealistic expectations.

[5] However, one more 'objective' reason could be the relatively egalitarian societies and the security provided by the Scandinavian welfare states.

[6] Note that UNDP's HDI index itself normally cannot be used in *sub-national level* studies. The life expectancy dimension requires repeated demographic measurements, which are normally only available at the national scale (M. Zeller, pers. e-comm., 18 Feb 2002).

[7] Figures are according to a recalculation done by Bruce Campbell (pers e-comm, 14 Oct 2002). Cavendish's own 'environmental resources' include wild vegetables (mostly from old agricultural fields and as weeds), gold panning, soil for pottery and natural fertilizers.

[8] This would not mean that everybody receives the same absolute amount of extra income but that everybody's income rises by the same percentage.

[9] The caveat of 'continuous' applies because of the *depth of poverty*. If a household is far below the poverty line initially, is economic growth sizeable enough to bring it above the poverty line?

[10] The Gini coefficient is a quantitative measure indicating what share of total income mass would hypothetically have to be redistributed in order to make the current distribution fully equal (i.e. with every recipient having an equal 'share of the cake').

[11] Other hypotheses to explain why equality is positive are based on political economy arguments: Governments in highly unequal countries face a stronger pressure for redistribution yet various redistribution measures (e.g. taxation) tend to hamper growth, at least in the short to medium term.

[12] The sequence of user groups in Table 1 represents an important socio-evolutionary history. Many human cultures originated in forests and forest dependence is to a significant degree, determined by a society's evolutionary stage.

[13] The classification follows Byron and Arnold (1999), except group no. 4, which has been added.

[14] This excludes payment for *off-site* ecological services, which we discuss in Section 4.4.

[15] There are also other important inputs into agriculture from forests, which are not dealt with in this section. These include fodder for livestock and green mulch, and represent key inputs into farming systems in some areas (e.g. Cavendish 2000,2002).

[16] Other dimensions for which data were collected include: geographic setting; product characteristics; production system; ecological implications of production; socioeconomic features of the raw material production area; processing industry and trade; institutional characteristics of producers; government policies and type of external interventions (Belcher and Ruiz-Pérez 2001).

[17] The fourth cell ("high forest-product contribution; low market orientation") was empty. Among the other cells, the frequency was 18 (subsistence), 28 (diversified) and 15 (specialised). However, the distribution should not be over interpreted, since the cases were not selected randomly.

[18] See Scherr *et al.* (2001) and Neumann and Hirsch (2000) for a comprehensive discussion.

[19] In some cases, the causation goes the other way—access to timber concessions made the rich people rich in the first place.

[20] We are grateful to William Sunderlin for suggesting four of these points.

[21] See also Scherr *et al.* (2001) for a more comprehensive review of opportunities.

[22] Own observation from Pará state, Brazil (Wunder).

[23] A third option here is that part of the high timber price is not economic rent at all but a reimbursement of the often under-estimated costs/value adding in transport, processing and marketing.

[24] The countries included and the share of forest based SSE employment: Bangladesh (13 %), Honduras (16 %), Sierra Leone (20 %), Egypt (24 %), Zambia (33 %) and Jamaica (35 %). Most studies were done around 1980. Firewood and charcoal were not included in the surveys.

[25] Botswana, Kenya, Lesotho, Malawi, Swaziland and Zimbabwe.

[26] 2.3 % might not sound impressive but one should keep in mind that in many villages only a minority of the population would be involved in off-farm work.

[27] These FAO data are also reported by Whiteman (2000: Table 2). Both in Whiteman and FAO (1997), reference is made back to other FAO documents and we were not able to trace the original source. The data are particularly doubtful because the share of forestry in exports is supposed to be less than 1% (FAO 1997), so almost the entire 23% of GDP would therefore be for subsistence use and the domestic market. From one of the author's (Angelsen) knowledge of Uganda, we can safely say that the FAO figure must be significantly off the mark.

[28] Poschen points to Chile as an illustrative case study, where new plantations at the expense of small scale cropping (especially in Region IX) have led to large macroeconomic benefits but have also sharply reduced on-site rural employment (Poschen 2001).

[29] Both forestry and agriculture will also create downstream jobs in processing industries, which have not been measured and compared here.

[30] A contrasting case here would be payments for *tolerable* land use changes. For example, the substitution of natural forests for agroforests instead of monocultures, thus safeguarding a range of services in a changing landscape (which would otherwise have been heavily degraded).

[31] Yet, the *status quo* assumption may sometimes be problematic. For example, when reforestation of an area would have been done even without carbon payments, raising the question of *additionality*.

[32] The BioCarbon Fund, recently launched by the World Bank, is a prototype fund for projects that sequester or retain carbon in forests and agro-ecosystems. Its target of USD 100 million is meant to fund projects outside the CDM and JI mechanisms. Examples of pre-identified projects include forest rehabilitation in Uganda and forest protection in the Dominican Republic.

[33] It has been shown that, under most scenarios, one dollar spent by a conservation donor on direct payments will create significantly more income than spending the same dollar on ICDP projects (Ferraro and Simpson 2002).

[34] See also Wells and Brandon (1992), Gilmour (1994) or Brandon *et al.* (1998). Many conservation donors and agencies are increasingly adopting people centred agendas that resemble those of development organisations and include poverty alleviation goals. An implicit but highly dubious assumption behind this is that the interests of forest conservation and economic development are synergistically linked (Wunder 2001).

[35] This discussion is parallel to the one on the role of agricultural technologies and intensification in containing deforestation, see Angelsen and Kaimowitz (2001).

[36] On the other hand, in those situations where agricultural expansion only occurs in *tandem* with logging penetration (e.g. after road building, etc.), from a conservation viewpoint it may be 'sufficient', at least in the short term, to impede logging because that will also jeopardise agricultural expansion.

[37] Of course, if there are site specific substitutes, the argument will be reversed. For instance, that would be the case where urban drinking water can be obtained from two alternative watersheds, one dominated by large landowners and the other by smallholders.

[38]This should include particularly the 'grey' literature, e.g. project reports and Master/PhD theses.

[39] While better general household data in many developing countries help to guide poverty reduction policies, little such progress has been made in marginal, forested areas.

[40] Country profiles for Bolivia, Honduras, Mali, Tanzania, Nepal and Viet Nam, 'The Role of Forestry in Poverty Alleviation', Cortevecchia, Italy, 3-7 September 2001 (see FAO 2001).

[41] For example, in Tanzania, forests and woodlands are critical cash income earners for the poor, accounting for as much as 50 % of the income in selected areas. As forest degradation is widespread, one would expect woodlands to receive high priority in poverty reduction plans. However, the International Monetary Fund and World Bank's Joint Staff Assessment of the Tanzanian PRSP makes no mention of the environment (including forests) at all. It largely argues that economic and structural reforms must continue and that these will eventually benefit the poor. See also Oksanen and Mersmann (2002) for a pioneering review of how forests have been included in PRSPs.

[42] http://www.cifor.cgiar.org/aboutus/ (accessed on 5 Oct 2001).

References

Adelman, I. and Morris, C.T. 1978 Growth and impoverishment in the middle of the 19th century. World Development 6 (3): 245-73.

Angelsen, A. 1997 The poverty-environment thesis: was Brundtland wrong? Forum for Development Studies 1997 (1): 135-154.

Angelsen, A. and Kaimowitz, D. (eds.) 2001 Agricultural technologies and tropical deforestation. CAB International, Wallingford, UK.

Arnold, J.E.M. 2001. Forestry, poverty and aid. CIFOR Occasional Paper No. 33. Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Arnold, J.E.M. and Townson, I. 1998 Assessing the potential of forest product activities to contribute to rural incomes in Africa. ODI Natural Perspectives 37: 1-4.

Arnold, J.E.M., Köhlin, G., Persson, R. and Shepherd, G. 2003 Fuelwood revisited: what has changed in the last decade? CIFOR Occasional Paper No. 39. Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Arnold, J.E.M., Liedholm, C., Mead, C. and Townson, I.M. 1994 Structure and growth of small enterprises in the forest sector in southern and eastern Africa. OFI Occasional Paper No. 47. Oxford Forestry Institute, UK.

Barro, R.J. 1999 Inequality, growth and investment. Working Paper No. 7038. National Bureau of Economic Research (NBER), Cambridge, MA.

Bass, S.O., Dubois, P., Moura Costa, M., Pinard, R., Tipper and Wilson, C. 2000 Rural livelihoods and carbon management. IIED Natural Resources Issues Paper No. 1. International Institute for Environment and Development (IIED), London.

Baumann, P. 2000 Sustainable livelihoods and political capital: arguments and evidence from decentralisation and natural resource management in India. Sustainable Livelihoods Working Paper No. 136. Overseas Development Institute (ODI), London.

Bebbington, A. 1999 Capitals and capabilities: a framework for analyzing peasant viability, rural livelihoods and poverty. World Development 27 (12): 2021-2044.

Belcher, B. and Ruiz-Perez, M. 2001 An international comparison of cases of forest product development: overview, description and data requirements. Working Paper No. 23. Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Bishop, J. and Landell-Mills, N. 2002 Forest environmental services: an overview. *In:* Pagiola, S., Bishop, J. and Landell-Mills, N. (eds.) Selling Forest Environmental Services, 15-36. Earthscan, London.

Bornschier, V. 1983 World economy, level development and income distribution: an integration of different approaches to the explanation of income inequality. World Development 11 (1): 11-20.

Brandon, K., Redford, K. and Sanderson, S. 1998 Parks in peril: people, politics, and protected areas. Covelo, Island Press, CA.

Brekke, K.A. and Howarth, R.B. 2000 The social contingency of wants. Land Economics 74 (6): 493-503.

Bruijnzeel, L.A. 1990 Hydrology of moist tropical forests and effects of conversion: a state of the knowledge review. Netherlands Committee for the International Hydrological Programme of UNESCO, Amsterdam.

Byron, R.N. and Arnold, J.E.M. 1999 What futures for the people of the tropical forests? World Development 27 (5): 789-805.

Calder, I.R. 1998 Water-resource and land-use issues. SWIM Paper 3., International Water Management Institute, Colombo, Sri Lanka.

Campbell, B.M. and Luckert, M. (eds.) 2002 Uncovering the hidden harvest: valuation methods for woodland and forest resources. Earthscan, London.

Campbell, B.M., Jeffrey, S., Luckert, M., Mutamba, M. and Zindi, C. 2002 Household livelihoods in semi-arid regions: options and constraints. Center for International Forestry Research (CIFOR), Bogor, Indonesia, p. 106.

Carney, D. (ed.) 1998 Sustainable rural livelihoods. What contributions can we make? Department for International Development (DFID), London.

Cavendish, W. 2000 Empirical regularities in the poverty-environment relationship of rural households: evidence from Zimbabwe. World Development 28 (11): 1979-2000.

Cavendish, W. 2002 Quantitative methods for estimating the economic value of resource use to rural households. *In:* Campbell, B.M. and Luckert, M. (eds.) Uncovering the hidden harvest: valuation methods for woodland and forest resources, 17-65. Earthscan, London.

Chambers, R. and Conway, G. 1992 Sustainable rural livelihoods: practical concepts for the 21st century. IDS Discussion Paper, No. 296. Institute for Development Studies (IDS), Brighton.

Chomitz, K.M. and Kumari, K. 1998 The domestic benefits of tropical forests: a critical review. The World Bank Research Observer 13 (1): 13-35.

CIAT 1999. Pathways out of poverty. CIAT in Perspective. International Center for Tropical Agriculture (CIAT), Palmira, Colombia.

CIFOR 1995 Management response to the 1995 Internally Commissioned External Review (ICER). Mimeo, Center for International Forestry Research (CIFOR), Bogor, Indonesia.

CIFOR 2001 Forest carbon, livelihoods and biodiversity. A report to the European Commission. Unpublished report, Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Cutter Information Corp. (CIC) 2000 Focus report: saving the forest with a timber lease. Global Environmental Change Report XII (19): 1-2.

de Janvry, A.I. and Sadoulet, E. 2000 Rural poverty in Latin America. Determinants and exit paths. Food Policy 25: 389-409.

Deininger, K. and Squire, L. 1998 New ways of looking at old issues: inequality and growth. Journal of Development Economics 57 (2): 259-287.

Desmond, H. and Race, D. 2001 Global survey and analytical framework for forestry out-grower arrangements. Food and Agriculture Organization of the United Nations (FAO), Rome.

Dollar, D. and Kraay, A. 2001 Growth is good for the poor. World Bank, Washington D.C.

Dove, M. 1993 A revisionist view of tropical deforestation and development. Environmental Conservation 20 (1): 17-24.

Duraiappah, A. 1996 Poverty and environmental degradation: a literature review and analysis. CREED WP Series No 8. International Institute for Environment and Development (IIED), London and Institute for Environmental Studies (IES), Amsterdam.

EPMR 1998 Report of the first External Programme and Management Review of the Center for International Forestry Research (CIFOR), TAC Secretariat, Food and Agriculture Organization of the United Nations.

FAO 1987 Small-scale forest-based processing enterprises. FAO Forestry Paper 79. Food and Agriculture Organization of the United Nations (FAO), Rome.

FAO 1997 State of the world's forests. Food and Agriculture Organization of the United Nations (FAO), Rome.

FAO 2001 How forests can reduce poverty. Forest Department Policy Brief. Food and Agriculture Organization of the United Nations (FAO), Rome, p. 36.

Ferraro, P.J. 2000 Global habitat protection: limitations of development interventions and a role for conservation performance payments. Department of Applied Economics and Management Working Paper No. 2000-03. Cornell University, Ithaca, USA.

Ferraro, P.J. and Simpson, R.D 2002 The cost-effectiveness of conservation payments. Land Economics 78 (3): 339-53.

Fields, G.S. 1980 Poverty, inequality and development, Cambridge University Press, Cambridge, UK.

Fields, G.S. 2001 Distribution and development: a new look at the developing world. Cambridge, New York and Russel Sage Foundation and MIT Press, London, p. 99.

Fisher, R.J. 2001 Poverty alleviation and forests: experiences from Asia. RECOFTC, Kasetsart University, Bangkok. www. RECOFTC.org/ publications_ at_recoftc. htm

Fisher, M. 2002 Household welfare and forest dependence in rural Malawi. Draft submitted to Environment and Development Economics, University of York, UK.

Grieg-Gran, M. 2000 Fiscal incentives for biodiversity conservation: the ICMS Ecológico in Brazil. Discussion Paper No. 00-01. International Institute for Environment and Development (IIED), London.

Gurung, C.P. and Coursey, M.D. 1994 Nepal: pioneering sustainable tourism. The Annapurna Conservation Area Project: an applied experiment in integrated conservation and development. The Rural Extension Bulletin 5 (August), University of Reading, UK.

Haggblade, S., Hazell, P. and Reardon, T. 2002 Strategies for stimulating poverty-alleviating growth in the rural nonfarm economy in developing countries. Discussion paper No. 92. International Food Policy Research Institute (IFPRI), Washington D.C.

Hardner, J. and Rice, R. 2002 Rethinking green consumerism. Scientific American May: 89-95.

Hill, H. 1992 Regional development in a boom and bust petroleum economy: Indonesia since 1970. Economic Development and Cultural Change 40 (2): 351-79.

ICER 1995 Internally Commissioned External Review. CIFOR, 28 September, Center for International Forestry Research (CIFOR), Bogor, Indonesia.

IPCC 2000 Land use, land-use change and forestry. A special report of the intergovernmental panel on climate change. Cambridge University Press, Cambridge, UK.

Kaimowitz, D. and Angelsen, A. 1998 Economic models of tropical deforestation: a review. Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Kaimowitz, D. 2002 Not by bread alone. Forests and rural livelihoods in sub-Saharan Africa. Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Kanbur, R. and Squire, L. 2001 The evolution of thinking about poverty. Exploring the interactions. *In:* Meier, G.M. and Stiglitz, J.E. (eds.) Frontiers in development economics. Oxford University Press, New York.

Kanbur, R. 2001 Economic policy, distribution and poverty. The nature of disagreements. World Development 29 (6): 1083-1094.

Kravis, I.B. 1960 International differences in the distribution of income. Review of Economics and Statistics November: 408-16.

Kuznets, S. 1955 Economic growth and income inequality. American Economic Review XLV (1): 1-28.

Kuznets, S. 1963 Quantitative aspects of the economic growth of nations: distribution of income by size. Economic Development and Cultural Change 11 (2) Part II: 1-80.

Landell-Mills, N. and Porras, I.T. 2002 Silver bullet or fools' gold? A global review of markets for forest environmental services and their impacts on the poor. Instruments for Sustainable Private Sector Forestry Series. International Institute for Environment and Development (IIED), London, p. 73-74, 143-145.

Lindberg, K. and Enríquez, J. 1994 An analysis of ecotourism's economic contribution to conservation in Belize. Volume 2: Comprehensive Report. Ministry of Tourism and the Environment, Belize and World Wildlife Fund, Washington D.C.

Lindert, P. H. and Williamson, J.G. 2001 Globalization and inequality: a long history. Paper read at World Bank Annual Bank Conference on Development Economics - Europe, Barcelona, 25-26 June, p. 36.

May, P.H., Veiga Neto, F., Denardin, V. and Loureiro, W. 2002 Using fiscal instruments to encourage conservation: municipal responses to the "ecological" value-added tax in Paraná and Minas Gerais, Brazil. *In:* Pagiola, S., Bishop, J. and Landell-Mills, N. (eds.) Selling forest environmental services. Market-based mechanisms for conservation and development, 173-200. Earthscan, London.

Mayers, J. 2000 Company-community forestry partnership: a growing phenomenon. Unasylva 200 (51): 33-41.

Mayers, J., Evans, J. and Foy, T. 2001 Raising the stakes. Impact of privatisation, certification and partnership in South African forestry. International Institute for Environment and Development (IIED), London.

Mayers, J. and Vermeulen, S. 2002 Company-community forestry partnership. From raw

deals to mutual gains? International Institute for Environment and Development (IIED), London.

Meadows, D.H. *et al*. 1972 The limits to growth. Universe Books, New York.

Mellor, J. 1999 Pro-poor growth - the relation between growth in agriculture and poverty reduction. Unpublished paper prepared for USAID.

Narayan, D., Chambers, R., Shah, M.K. and Petesch, P. 2000 Voices of the poor. Crying out for change. Oxford University Press, New York.

Nawir, A.A., Santoso, L. and Mudhofar, I. 2002 Towards Mutually-beneficial partnership in outgrower schemes: lessons learnt from Indonesia. Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Neumann, R.P. and Hirsch, E. 2000 Commercialisation of non-timber forest products: review and analysis of research. Center for International Forestry Research (CIFOR), Bogor, Indonesia and Food and Agriculture Organization of the United Nations (FAO), Rome, p. 35.

Offer, A. 2000 Economic welfare measurements and human well-being. Discussion Papers in Economic and Social History, No. 34. University of Oxford, UK.

Oksanen, T. and Mersmann, C. 2002 Forests in poverty reduction strategies. An assessment of the PRSP processes in sub-Saharan Africa. Paper presented at the international workshop: Forests in Poverty Reduction Strategies - Capturing the Potentials. Helsinki, Finland, 1-2 October.

Pagiola, S. 2001 Paying for water services. Forest Trends Workshop on New Markets for a Green Economy, Teresópolis, Brazil, 24-26 March. http://www.forest-trends.org/whoweare/pdf/brazil2001/Paying%20for%20Water%20Services.pdf (18 Oct. 2001).

Pagiola, S. and Ruthenberg, I.M. 2002 Selling biodiversity in a coffee cup. *In:* Pagiola, S., Bishop, J. and Landell-Mills, N. (eds.) Selling forest environmental services. Market-based mechanisms for conservation and development, 103-126. Earthscan, London.

Pagiola, S., Bishop, J. and Landell-Mills, N. 2002 (eds.) Selling forest environmental services. Market-based mechanisms for conservation and development. Earthscan, London, p. 282-4.

Pattanayak, S.K. and Sills, E.O. 2001 Do tropical forests provide natural insurance? The microeconomics of non-timber forest product collection in the Brazilian Amazon. Land Economics 77 (4): 595-612.

Poschen, P. 1997 Forests and employment, much more than meet the eye. World Forestry Congress, Antalya, Turkey, October 13-27. Volume 4, Topic 20, Food and Agriculture Organization of the United Nations (FAO), Rome. http://www.fao.org/montes/foda/wforcong/PUBLI/V4/T20E/1-5.HTM#TOP

Poschen, P. 2001 Social and labour dimensions of the forestry and wood industries on the move. TMFWI/2001. International Labour Organization (ILO), Geneva, p. 3-33, 70-71.

Ravallion, M. 1997 Good and bad growth: the Human Development Reports. World Development 25 (5): 631-638.

Ravallion, M. 2001 Growth, inequality and poverty: looking beyond averages. World Development 29 (11): 1803-1815.

Ravallion, M. and Datt, G. 2002 Why has economic growth been more pro-poor in some states of India than others? Journal of Development Economics 68 (2): 381-400.

Ray, D. 1998 Development economics. Princeton University Press, Princeton, NJ.

Ravnborg, H.M. 2002 Poverty and soil management. Relationships from three Honduran watersheds. Society and Natural Resources 15: 523-39.

Rodrick, D. 2000 Institutions for high-quality growth: what they are and how to acquire them. NBER Working Paper W7540. National Bureau of Economic Research (NBER), Cambridge, MA.

Ross, M. 2001 Timber booms and institutional breakdown in Southeast Asia. Cambridge University Press, Cambridge, UK.

Ruggeri-Laderchi, C. 2001 Participatory methods in the analysis of poverty: a critical review. Working Paper No. 62. University of Oxford, UK.

Ruitenbeek, H.J. 1988 Social cost-benefit analysis of the Korup Project, Cameroon, World Wide Fund for Nature, London.

Ruiz-Perez, M., Belcher, B. *et al*. 2003 Global patterns and trends in non-timber forest product use. Manuscript. Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Sala-i-Martin, X. 2002 The world distribution of income (estimated from individual country distributions). NBER Working Paper 8933. National Bureau of Economic Research (NBER), Cambridge, MA.

Sayer, J. A. *et al.* 2000 World Heritage forests: the World Heritage conservation as a mechanism for conserving tropical forest biodiversity. Government of Indonesia, UNESCO and Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Scherr, S.J. 2000 A downward spiral? Research evidence on the relationship between poverty and natural resource degradation. Food Policy 25: 479-98.

Scherr, S.J., White, A. and Kaimowitz, D. 2001 Strategies to improve rural livelihoods through markets for forest products and services. Forest Trends, Washington D.C., p. 44.

Scoones, I. 1998 Sustainable rural livelihoods: a framework for analysis. IDS Working Paper No. 72. Institute for Development Studies (IDS), Brighton.

Sen, A. 2001 Development as freedom, Anchor Books, New York.

Sheil, D. and Wunder, S. 2002 The value of tropical forests to local communities: complications, caveats and cautions. Conservation Ecology 6 (2): 9. http://www.consecol.org/vol6/iss2/art9

Shepherd, G., Arnold, M. and Bass, S. 1999 Forests and sustainable livelihoods. A contribution to the World Bank Forest Policy review process, September. http://wbln0018.worldbank.org/essd/forestpole.nsf/MainView

Smith, J., Mulongoy, K., Persson, R. and Sayer, J. 2000 Harnessing carbon markets for tropical forest conservation: towards a more realistic assessment. Environmental Conservation 27 (3): 300-311.

Smith, J. and Scherr, S.J. 2002 Forest carbon and local livelihoods: assessment of opportunities and policy recommendations. CIFOR Occasional Paper No. 37. Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Sunderlin, W.D., Angelsen, A. and Wunder, S. 2003 Forests and poverty alleviation. *In:* FAO, State of the world's forests, 61-73. Food and Agriculture Organization of the United Nations (FAO), Rome.

The Zimbabwe Trust, The Department of National Parks and Wildlife Management and The Campfire Association 1994 Zimbabwe: tourism, people and wildlife. The Rural Extension Bulletin 5 (August), University of Reading, UK.

Thomas, V., Aailami, M., Dhareshwar, A., Kaufmann, D., Kishor, N., López, R. and Wang, Y. 2000 The quality of growth. World Bank, Washington D.C.

Vincent, J.R., Ali, R.M. and Associates 1997 Environment and development in a resource rich economy. Malaysia under the new economics order. Harvard University Press, for (Harvard Institute for International Development) HIID, Cambridge, MA.

Vincent, J.R. and Binkley, C.S. 1992 Forest-based industrialization: a dynamic perspective. *In:* Sharma, N.P. Managing the World's Forests, 93. Kendall/Hunt Publishing Company, Dubuque, Iowa.

Warner, K. 2000 Forestry and sustainable livelihoods. Unasylva 51 (202): 3-12.

Warr, P.G. 2000 Indonesia: Trade shocks and construction booms. *In:* Collier, P. and Gunning, J.W. (eds.) Trade shocks in developing countries. Volume 2: Asia And Latin America. Oxford University Press, Oxford, pp. 326-54.

Webster 1993 [1961] Webster's third new international dictionary of the English language unabridged, Merriam-Webster Inc., Springfield, Massachusetts.

Wells, M.P. 1997 Economic perspectives on nature tourism, conservation and development. Environmental Economics Series, Environment Department Paper No.55. The World Bank, Washington D.C.

Westoby, J.C. 1962 The role of forest industries in the attack on under-development. The state of food and agriculture 1962. Food and Agriculture Organization of the United Nations (FAO), Rome (reprinted *In:* Westoby J.C. The purpose of forests. Blackwell).

Westoby, J.C. 1978 Forest industries for socio-economic development. Commonwealth Forestry Review 58 (2): 107-16 (reprinted *In:* Westoby J.C. The purpose of forests. Blackwell).

White, A. and Martin, A. 2002 Who owns the world's forests? Forest tenure and public forests in transition. Forest Trends, Washington, D.C.

Whiteman, A. 2000 Promoting rural development through forestry policy: some experiences from developing countries. Presentation to the seminar: The Role of Forests and Forestry in Rural Development—Implications for Forest Policy. July 5-7, Vienna, Austria.

Williamson, J.G. 1985 Did British capitalism breed inequality? Routledge, London.

Williamson, J.G. 1997 Industrialization, inequality and economic growth. Edward Elgar, London.

World Bank 2000 World development report 2000/2001: attacking poverty. World Bank, Washington D.C.

World Bank 2001 A revised forest strategy for the World Bank group. World Bank, Washington D.C., Draft 30 July, p. 14-15.

Wunder, S. 1987 Økonomisk udvikling og indkomstfordeling - en analytisk oversigt og et cross-country studie. Master thesis, Institute of Economics, University of Copenhagen.

Wunder, S. 1999 Forest conservation through ecotourism income? A case study from the Ecuadorian Amazon region, CIFOR Occasional Paper No. 21. Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Wunder, S. 2000 Big island, green forests and backpackers. Land-use and development options on Ilha Grande, Rio De Janeiro State, Brazil. CDR Working Paper 00.3. Centre for Development Research (CDR), Copenhagen.

Wunder, S. 2001 Poverty alleviation and tropical forests - what scope for synergies? World Development 29 (11): 1817-1833.

Zeller, M., Sharma, M., Henry, C. and Lapenu, C. 2001 An operational tool for evaluating poverty outreach of development policies and projects. IFPRI, FCND Discussion Paper, No.111. International Food Policy Research Institute (IFPRI), Washington D.C.

Appendix.
Strategic Questions for Poverty-Forest Research at CIFOR

This appendix deals with some strategic questions for future poverty research specifically at CIFOR but would also be of interest to other institutions conducting research in this field. Here, in a slightly more provocative manner, we put forward the pros and cons, *vis-à-vis* a series of strategic research choices. We do not always provide definitive viewpoints, preferring to sometimes simply provide both the arguments for and against so partisans in different camps can make their own judgements.

CIFOR and poverty—in the past

Poverty is currently a 'hot' topic in the international debate but how dominant should it be in CIFOR research? If we compare the world today to 1993, when CIFOR was formed, the proportion of absolute income-poor in developing countries has on average, actually declined. Hence, it is legitimate to ask the provocative question: To what extent should changes (of unpredictable duration) in donor trends and political winds dictate CIFOR's research agenda? CIFOR's current mission statement reflects the institution's double mandate, encompassing both environmental and people centred concerns and objectives:

> "To contribute to the *sustained well-being of people* in developing countries, particularly in the tropics, through collaborative strategic and applied research and related activities in forest systems and forestry, and by promoting the transfer of appropriate new technologies and the adoption of new methods of social organisation, for *national development*" (our emphases).[42]

Rather than referring directly to poverty and its alleviation, CIFOR's mission speaks of the "sustained well-being of people"—a somewhat broader concept, as discussed in Section 2. At the time of writing the mission statement, poverty was deliberately not chosen as many felt it implied a narrow income focus (G. Shepherd, pers.comm., Nov 2001). Since then however, the poverty concept has been broadened in the international debate (cf. Section 2) and this argument is therefore less valid today. Note that the focus on "national development" implies an explicit recognition that the forestry sector needs to deliver goods and services not only to marginalised forest dwellers but also to the whole of society.

CIFOR's degree of poverty orientation is not a new discussion topic—it has been a recurrent point of debate since CIFOR was created in 1993. CIFOR's Internally Commissioned External Review (ICER) from 1995 raised two concerns. Firstly, an "ambiguous level of interest in tropical dry forests" was noted to be poverty-relevant because "these forests are able to support a higher population density". Plantations were also outlined as an under-prioritised area with a poverty reduction potential. Secondly, the review team observed that CIFOR focused "on macro-level processes rather than farmer-level processes in its research thrusts", implying that little research was targeted to poor people. As the report stated: "There is a tendency for forestry research and the resulting interventions to offer too little to poor people unless explicit attempts to do so have been built in". Hence, the critical assessment was that "there are potential win-win situations.... but often [the] research is at best irrelevant to poor people" (ICER 1995).

CIFOR's management responded to the ICER (CIFOR 1995) in a way that acknowledged both options and limitations to pushing forward the poverty agenda in an international forest research organisation:

- "Most of CIFOR's forestry NARS partners do not consider poverty alleviation to be a primary or even important focus."
- "In the future, forests in sub-humid and drier tropics should figure more prominently in our activity portfolio."
- "Funding for CIFOR comes from conservation budgets within aid agencies whose prime concern is environmental protection and not poverty alleviation. There is therefore an inevitable mismatch between CIFOR's research agenda and that of the CGIAR."

Three years later, the External Programme and Management Review of CIFOR (EPMR 1998) stated that the institute's broad well-being approach already incorporated poverty concerns well and provided an appropriate bridge between its environmental mandate and that of the CGIAR (Consultative Group on International Agricultural Research):

- "This broader interpretation of poverty issues provides a logical, and indeed necessary, link between CIFOR's mission and the goals of CGIAR related to poverty alleviation plus natural resources and environmental protection and enhancement."
- "CIFOR's programme expands this interpretation to include consideration of [the] means of poverty prevention—poverty for future generations and future poverty for those who currently are living in adequate conditions."

The two different reviews of CIFOR's poverty orientation thus also reveal how much a poverty oriented evaluation depends on the poverty concepts applied (see Section 2). Currently, all of CIFOR's three research programmes work with issues that to some extent relate to poverty and poor people. In light of the comments in ICER in 1995, much more work is carried out at the micro level but there is a continued discussion about the balance between micro-oriented case studies *vs.* national and global-comparative studies. Poverty issues are now much higher on the agendas of donors, while this is still much less the case for the NARS (National Agricultural Research Systems).

How important should poverty alleviation be relative to other goals?

CIFOR has recently attempted to think strategically about its impact in terms of the CGIAR's summary goal of "poverty alleviation, food security and environmental protection" (PAFSEP). This consensus concept is attractive from an institutional planning viewpoint. Everybody in the organisation is supposed to work towards the same overall super goal. However, in applied field situations, many of CIFOR's researchers have found it difficult to give real meaning to PAFSEP. In practice, there proves to be mostly a split between the goals PAFS and EP and sometimes between PA and FSEP. Unlike what was claimed above in the ICER (1995), tropical forest win-win options prove to be quite limited (Wunder 2001). In many real world situations, making people better off tends to have environmental costs and protecting forests tends to restrict people's development and poverty reduction aspirations. Faced with these trade offs, PAFSEP might become like a piece of wet soap in the hands of the researcher trying to apply the concept.

In the light of this less optimistic worldview, several options emerge. First, one might take the position that CIFOR should only research and promote actions that benefit both people and forests at the same time, hence confining itself to the 'win-win' sphere. That would also include the reversal of 'lose-lose' policies and outcomes, which neither benefit the poor nor the forests. It could also embrace longer term efforts to *reduce* the trade offs (i.e. turning win-lose/lose-win into win-win situations). However, to stay away from all development-conservation controversies would radically limit CIFOR's radius of action. It is the trade offs, not the win-win scenarios that abound in the world of tropical forests.

Second, some might find that a poverty orientation should officially take priority over conservation. In that case, poverty reduction should be our over-arching concern, while the solutions we work for should, as far as possible, not hurt the environment. Also, one might question to what extent it is the legitimate role of a research organisation to advance policy statements when they have strong normative components (e.g. regarding the redistribution of resources). Further, environmental concern and conservationist value judgements were clearly the driving force behind CIFOR's creation in the early 1990s. To make forest conservation a subordinate concern may ultimately bewilder the institution's core constituency and erode both its image and a significant part of its funding base.

A third option is to be confined to presenting the alternatives—make the trade offs explicit and let others make the choices. That would mean that in most situations we should not strive for *impact* (which presupposes a clear definition of desirable outcomes) but rather for *influence* (enabling others to make more informed choices on a menu of options). To us, this sounds like the most appealing alternative. However, we recognise that the choices of research topics, research design and methodologies etc., are eventually all influenced

by subjective (and normative) valuations. The message from the positivism debate in the 1970s is still valid: *Try to be objective but don't believe that you are!*

Making the trade offs explicit will thus often bring us close to judgements about the desirability of an outcome. Making explicit normative judgements about trade offs is a fourth option. Consider the specific trade off between poverty reduction and forest conservation. Most researchers would probably not accept that a one dollar annual income increase for one household is worth cutting 100 ha of primary forest. But 100 dollars each year for each of 100 families just might be worth it, in the context of a poor developing country. Thus one attempts to identify the 'win-more—lose-less' (and the 'lose-less—win-more') situations. This relates to the increasingly popular yet controversial concept of 'good deforestation'—a forest loss deemed acceptable because of the high net benefits to people from its conversion to other uses. Its logical twin is even more controversial: 'good impoverishment'—the act of making people (just a little bit) worse off for the sake of safeguarding outstanding environmental values. The way the winds are blowing currently, that concept certainly does not have a taste of political correctness!

In either case, there definitely seems to be a strong case for analysing the trade offs between the different objectives contained in PAFSEP and making them apparent to the different stakeholders. Part of a useful myth busting role is just to show in how few cases PAFSEP is an unambiguously defined goal. Conversely, an important influence for a research organisation should be to contribute to a realistic vision of these trade offs on behalf of forest stakeholders, rather than advocating a unidirectional device. Exploring trade offs and options to minimise them are key elements of policy oriented research.

'Safety nets' or 'engines of growth'—poverty prevention or reduction?

As argued earlier, forest products are critical as safety nets to many poor. Their role as a principal food or cash income earner is less significant and the general potential of forest products to elevate living standards over time is controversial. Given this picture, should future CIFOR research be on the poverty prevention/safety net function or on monetary income generation and poverty reduction? The simple answer is both! But the question of relative emphasis remains. This has a scientific dimension—what is most important to the poor and what are the likely potentials of forests? There is also a strategic dimension—how to argue the case of forestry to donors, governments and other policy makers. For instance, putting *emphasis on the safety net functions* of forests can be justified on several grounds:

- Qualitative documentation (though rarely quantification) of the forest safety net role exists in most cases, as opposed to the income generating function. One might risk over-estimating the poverty alleviation value of forests by putting too much emphasis on the latter. In most rural settings, sectors other than forestry have a larger potential for stimulating pro-poor economic growth and employment.
- Forest degradation and deforestation threaten the forest based safety nets of poor people without adequate alternatives or opportunities in place. The most urgent issue in many places is therefore to prevent further deprivation. Ultimately, this affects many times more people than those who will ever have the chance to use forest products as a development pathway *out of* poverty.
- Poverty (and forest dependence) is not likely to go away. "The poor will always be with us"—in spite of ambitious reduction targets such as the Millennium Development Goals (MDG). This is particularly the case in those regions of sub-Saharan Africa and South Asia where economic growth is likely to be too small to cut poverty by 50 % by the year 2015, as the MDG set forth. We need to be realistic and give priority to these underprivileged regions—at the end of the day, it is people's survival that is at stake.
- The safety net functions are more likely to represent win-win situations, at least for the poorest of the poor and the environment. Maintaining the *status quo* favours both the conservation of forests and the livelihoods of the very poor who depend upon them. It is a 'lose' situation for external developers but that is easier to justify in ethical terms.

Conversely, arguments for a relatively *stronger emphasis on income generation* include:

- In the past, the potential of forests has been under-utilised. Due to the relatively recent changes in the six enabling conditions mentioned in Section 4, the world now looks different. New development thinking, policies, markets and technology have created new opportunities that set the stage for substantial improvements in forest based benefits for the poor. If we monitor, analyse and document these processes, we can help to replicate the success stories. The potential is there—we just need to exploit it.
- Forest safety nets represent a temporary stage, losing their importance with economic development. When people replace forests, they also replace forest safety nets with other safety nets—but forest researchers rarely take notice. To make this transitory survival strategy (the 'employment of last resort') assume first priority on an international research institute's agenda would be like sending an army down a dead end street.
- The main emphasis in the international debate is on poverty reduction and promising the maintenance of the *status quo* is too defensive a marketing strategy for donors and policy makers. Poor people want development, not just static safety nets! To insist that they need to keep forests only as a cushion will prepare the ground for development strategies and interventions that become poverty traps. Besides, safety net functions are already reasonably well known, offering limited research potential.
- Even if forest safety nets were truly vital, it is hard to see what research really can contribute to enable mainly subsistence uses. What are the points of leverage? The only objective would be to mechanically document more and more cases and keep saying in public that forests should be conserved. The latter is probably better done by an advocacy organisation than by an international research institute.

Target groups

Closely linked to the previous question is the issue of target groups. Should research focus on the very poor (the 'poorest of the poor') or on the moderately poor—what should be the relative emphasis? Should we exclusively be concerned with people at the forest margin, with rural populations in general or also with the urban poor?

The very poor normally lack the resources necessary to respond pro-actively to new economic opportunities (see Section 3). Either one needs extremely targeted measures to reach this group—or they are most likely to benefit from general labour intensive growth, notably in agriculture and certain types of industries and services. Forestry is probably not an adequate *development* tool to reach the poorest of the poor. However, if the main emphasis is on the 'defensive' safety net function of forests, the primary target group would in this case, be the poorest of the poor. Yet, if the main emphasis is on commercialisation, cash income generation and poverty reduction, one should realise that these interventions are probably more likely in the here and now, to benefit the moderately poor—and eventually also the better off people.

Further, one needs to recognise that the situation and interests of 'the moderately poor' and 'the poorest of the poor' seldom move harmoniously in the same direction. Often they have opposite interests and actions designed to favour one group may hurt the other. At the aforementioned FAO forum on poverty and forests, community forestry in Nepal was mentioned as an example. Closure of forests and other restrictions on non-sustainable uses were said to have hurt the very poor (e.g. landless charcoal makers or fuelwood gatherers), while they had benefited the moderately poor landowners. While advocates of community forestry objected to that general characterisation, it cannot be denied that subgroups of the 'poorest of the poor' often benefit from forest degradation, posing an additional dilemma for those who want to help both the forests and the poor.

Another dimension of targeting refers to categories of socioeconomic groups of forest dependent people (cf. Table 1). How far from the forests should we go? Almost everybody would include both of the first two groups (forest dwellers and farmers living adjacent to forests). Many people are also inclined to target the third group, commercial users of forest products, although some of these 'forest products' do not

come from forests in a strict sense. However, a main question is whether poor urban consumers should be included too. The importance for the urban poor of fuelwood and sometimes charcoal, construction poles and low cost furniture, is an argument in favour.

Observing the whole product cycle makes it possible to grasp the entire economic value of an activity (i.e. not just the producer but also the consumer surplus). For instance, CIFOR's work in Cameroon has been looking at urban marketing of forest products, revealing the importance of certain NTFPs to disadvantaged urban people. Bushmeat consumption in Central and Western Africa also constitutes an important urban commodity, especially as a source of protein. We should remember that for the time being, CIFOR's mandate also aims to look at *national* development, not only at rural areas or forest dwelling people.

On the other hand, there are also arguments against the inclusion of the urban poor as a target group. Research might lose focus, considering the large number of urban consumers, the indirect and complex linkages—and in most cases, there is probably only a very small weighting of forest products in the urban poor's consumption baskets. Even when forest products are important to the urban poor, they are not critical and we would normally expect the provision of cheap forest products to contribute little to urban poverty reduction.

CIFOR Occasional Paper Series

1. Forestry Research within the Consultative Group on International Agricultural Research
   Jeffrey A. Sayer
2. Social and Economical Aspects of Miombo Woodland Management in Southern Africa: Options and Opportunities for Research
   Peter A. Dewees
3. Environment, development and poverty: A Report of the International Workshop on India's Forest Management and Ecological Revival
   Uma Lele, Kinsuk Mitra and O.N. Kaul
4. Science and International Nature Conservation
   Jeffrey A.Sayer
5. Report on the Workshop on Barriers to the Application of Forestry Research Results
   C.T.S. Nair, Thomas Enters and B. Payne
6. Production and Standards for Chemical Non-Wood Forest Products in China
   Shen Zhaobang
7. • Cattle, Broadleaf Forests and the Agricultural Modernization Law of Honduras: The Case of Olancho
   • (Spanish edition) Ganadería, bosques latifoliaods y Ley de Modernizatción en Honduras: El caso de Olancho
   William D.Sunderlin and Juan A.Rodriguez
8. High quality printing stock - has research made a difference?
   Francis S.P. Ng
9. • Rates Causes of Deforestation in Indonesia: Towards a Resolution of the Ambiguities
   • (Indonesian edition) Laju dan Penyebab Deforestasi di Indonesia: Penelaahan Kerancuan dan Penyelesaiannya
   William D. Sunderlin and Ida Aju Pradnja Resosudarmo
10. Report on Discussion Forum on Irformation Services in the Asia-Pacific and AGRIS/CARIS in the 21st Century and Asia-Pacific Regional Consultation
    Michael O. Ibach and Yvonne Byron
11. Capacity for Forestry Research in the Southern African Development Community
    Godwin S. Kowero and Michael J. Spilsbury
12. Technologies for sustainable forest management: Challenges for the 21st century
    Jeffrey A. Sayer, Jerome K. Vanclay and R. Neil Byron
13. Bosques secundarios como recurso para el desarrollo rural y la conservación ambiental en los trópicos de América Latina
    Joyotee Smith, César Sabogal, Wil de Jong and David Kaimowitz
14. Cameroon's Logging Industry: Structure, Economic Importance and Effects of Devaluation
    Richard Eba'a Atyi
15. • Reduced-Impact Logging Guidelines for Lowland and Hill Dipterocarp Forests in Indonesia
    • (Indonesian edition) Pedoman Pembalakan Berdampak Rendah untuk Hutan Dipterocarpa Lahan Rendah dan Bukit di Indonesia
    Plinio Sist, Dennis P. Dykstra and Robert Fimbel
16. Site Management and Productivity in Tropical Forest Plantations
    A. Tiarks, E.K.S. Nambiar and Christian Cossalter
17. Rational Exploitations: Economic Criteria and Indicators for Sustainable Management of Tropical Forests
    Jack Ruitenbeek and Cynthia Cartier
18. Tree Planting in Indonesia: Trends, Impacts and Directions
    Lesley Potter and Justin Lee
19. Le Marche des Produits Forestiers Non Ligneux de l'Afrique Centrale en France et en Belgique: Produits, Acteurs, Circuits de Distribution et Debouches Actuels
    Honoré Tabuna
20. Self-Governance and Forest Resources
    Elinor Ostrom
21. Promoting Forest Conservation through Ecotourism Income? A case study from the Ecuadorian Amazon region
    Sven Wunder
22. Una de Gato: Fate and Future of a Peruvian Forest Resource
    Wil de Jong, Mary Melnyk, Luis Alfaro Lozano, Marina Rosales and Myriam García
23. Les Approches Participatives dans la Gestion des Ecosystemes Forestiers d'Afrique Centrale: Revue des Initiatives Existantes
    Jean-Claude Nguinguiri
24. Capacity for Forestry Research in Selected Countries of West and Central Africa
    Michael J. Spilsbury, Godwin S. Kowero and F. Tchala-Abina
25. L'Ímpact de la Crise Economique sur les Populations, les Migration et le Couvert Forestier du Sud-Cameroun
    Jacques Pokam Wadja Kemajou and William D.Sunderlin
26. • The Impact of Sectoral Development on Natural Forest Conservation and Degradation: The Case of Timber and Tree Crop Plantations in Indonesia
    • (Indonesian edition) Dampak Pembangunan Sektoral terhadap Konversi dan Degradasi Hutan Alam: Kasus Pembangunan HTI dan Perkebunan di Indonesia
    Hariadi Kartodihardjo and Agus Supriono
27. L'Impact de la Crise Économique sur les Systèmes Agricoles et le Changement du Couvert Forestier dans la Zone Forestière Humide du Cameroun
    Henriette Bikié, Ousseynou Ndoye and William D.Sunderlin
28. • The Effect of Indonesia's Economic Crisis on Small Farmers and Natural Forest Coverin the Outer Islands
    • (Indonesian Edition) Dampak Krisis Ekonomi Indonesia terhadap Petani Kecil dan Tutupan Hutan Alam di Luar Jawa
    William D. Sunderlin, Ida Aju Pradnja Resosudarmo, Edy Rianto, Arild Angelsen
29. The Hesitant Boom: Indonesia's Oil Palm Sub-Sector in an Era of Economic Crisis and Political Change
    Anne Casson
30. The Underlying Causes of Forest Decline
    Arnoldo Contreras-Hermosilla
31. 'Wild logging': The rise and fall of logging networks and biodiversity conservation projects on Sumatra's rainforest frontier
    John F. McCarthy
32. Situating Zimbabwe's Natural Resource Governance Systems in History
    Alois Mandondo
33. Forestry, Poverty and Aid
    J.E. Michael Arnold
34. The Invisible Wand: Adaptive Co-management as an Emergent Strategy in Complex Bio-economic systems.
    Jack Ruitenbeek and Cynthia Cartier
35. Modelling Methods for Policy Analysis in Miombo Woodlands
    A. A Goal Programming Model for Planning Management of Miombo Woodlands
       I. Nhantumbo and Godwin S. Kowero
    B. A System Dynamics Model for Management of Miombo Woodlands
       Ussif Rashid Sumaila, Arild Angelsen and Godwin S. Kowero
36. How to Know More about Forests? Supply and Use of Information for Forest Policy
    K. Janz and R. Persson
37. Forest Carbon and Local Livelihoods: Assessment of Opportunities and Policy Recommendations
    Joyotee Smith and Sara J. Scherr
38. • Fires in Indonesia: Causes, Costs and Policy Implications
    • (Indonesian edition) Kebakaran Hutan di Indonesia: Penyebab, Biaya dan Implikasi Kebijakan
    Luca Tacconi
39. Fuelwood Revisited: What Has Changed in the Last Decade?
    Michael Arnold, Gunnar Köhlin, Reidar Persson and Gillian Shepherd

Center for International Forestry Research

CIFOR Occasional Paper publishes the results of research that is particularly significant to tropical forestry. The content of each paper is peer reviewed internally and externally, and published simultaneously on the web in downloadable format (www.cifor.cgiar.org/publications/papers).

Contact publications at *cifor@cgiar.org* to request a copy.

The Center for International Forestry Research (CIFOR) was established in 1993 as part of the Consultative Group on International Agricultural Research (CGIAR) in response to global concerns about the social, environmental and economic consequences of forest loss and degradation. CIFOR research produces knowledge and methods needed to improve the well-being of forest-dependent people and to help tropical countries manage their forests wisely for sustained benefits. This research is done in more than two dozen countries, in partnership with numerous partners. Since it was founded, CIFOR has also played a central role in influencing global and national forestry policies.

DFID Department for International Development

CIFOR 1993 - 2003 Science for Forests and People

CIFOR is one of the 16 Future Harvest centres of the Consultative Group on International Agricultural Research (CGIAR)

CGIAR

FUTURE HARVEST℠