



Poverty reduction by tropical forests: rhetoric or a viable option?

Matti Palo^[3]

ABSTRACT

This paper is aimed to respond to the most essential issue raised in its title. Both income (GDP/capita) and Human Development Index as national poverty measures are regressed with relative forest area as a dependant variable, and with population density, Corruption Perception Index and some other independent variables in 35-83 tropical countries covering 70-95 percent of the total tropical forest area. It was found that the two poverty variables were strongly correlated with the relative forest area. It was deduced that high population density at low income levels advances forest degradation, deforestation and desertification. The deteriorated forest environment increases poverty, which in turn increases population pressure on the remaining forest, and so on in a vicious cycle. The prevailing practice of administrative pricing of the standing timber undervalues the tropical forest. Therefore, the opportunity cost of sustainable forestry remains artificially too high and is expanding deforestation with corruption and some other causes underlying the local visible agents of deforestation. The widely prevailing corruption in the tropics is blocking the effectiveness of both the government policies and the market means, which are the only ways to control the allocation, production and distribution of forest products and services. Finland never had any wide scale corruption and it has therefore had less government and market failures than the tropical countries. In Finland increasing exports of forest products have made forestry more profitable and agricultural fields more productive and they have in this way reduced poverty on a national scale. In the tropics increasing exports have advanced deforestation with minimal impacts in poverty reduction. Finland, Costa Rica, Republic of Korea, Sweden and Japan all have transited into sustainable forestry practices. They all share prevailing private forest ownership and advanced political, social, human, financial, natural and physical capitals, while most of the tropical countries are lacking such endowments as a balanced mix. Therefore, poverty reduction on a national scale by the tropical forests will remain as rhetoric for the time being. It may become a viable option only in a couple of decades with reducing corruption and a major devolution of the prevailing socialistic forestry.

INTRODUCTION

“Members of the human species are children of the forest. The evolution of civilization is intertwined with forests; at the center of our history lies the story of their use” (Druska & Kontinen 1997, p. 15).

The Millennium Declaration of September 2000 has been adopted by 189 countries. The United Nations (UN) declared to halve the number of the extreme poor and of the people suffering from

hunger by 2015 as the first of the eight goals in its Declaration. The UN Secretary-General announced to the UN General Assembly the making of a road map for achieving the eight Millennium Goals via 18 targets and 48 indicators. The Goals have been regarded unique in their ambition, concreteness and scope. It is also being recognized that the halving of poverty and the attainment of the other related goals can be achieved only through stronger partnership among all development actors and especially through increased action by rich countries (UNDP 2003, p. 27).

Therefore, it is no wonder, that attacking poverty has lately become a popular rhetoric among the intergovernmental organizations (IGOs) and the non-governmental organizations (NGOs) as well as the national development agencies. UNDP (2003) has contributed on the follow-up and instruments on how to end human poverty since 1990 by publishing its Human Development Index annually. The latest report introduces a penetrating analysis of how the countries are related in achieving the eight Millennium Goals and how to launch improvements.

The World Bank (2001, 1990) launched its poverty report lately as a follow-up of its poverty report eleven years earlier. The concept of poverty has been expanded since 1990 in an interesting way (see below). The new forest strategy of the Bank sets poverty reduction as one of the three main pillars (World Bank 2003). The Asian Development Bank (2001) joined the effort with its poverty reduction agenda. Also FAO has adopted an agenda (FAO/DFID 2001), how forests can reduce poverty, with some later ramifications (FAO 2003). "Forests in poverty reduction strategies: capturing the potential" (Oksanen *et al.* 2003) is just one title of a number of seminars and workshops (e.g. SNU 2003) in this field lately.

I come from Finland, which lies in northern Europe between the 60th and 70th parallels of the northern latitude. Finland has an area of 338 000 km² (of which 10 percent is of inland waters) and a population of 5 million; thus the population density is 17 persons km⁻². Only Iceland as a whole country has such a northern location. Sweden lies next westwards from Finland, but 83 percent of the population lives more south of the 60th latitude. In those peripheral locations there traditionally were not available so many options to survive than on the more southern latitudes.

Therefore, the Icelanders have been fishing and processing fish, while the Finns have primarily, in the past, been growing and processing timber. With those means the two nations have successfully participated in international trade and created some of the highest levels of living standard among the nations in the world (UNDP 2003). Most of the tropical countries have had traditionally, by their location and endowment of natural resources, more viable options available for survival and livelihoods.

Finland has 0.5 percent of the world total forest area and 15 percent of the value of total global forest products exports. Finland has clearly the highest value of forest products exports per capita and the highest share of the value of the total commodity exports among the eight major exporters of forest products in the world (Figure 1). Forestry and forest products industry have played a key role in reducing poverty in Finland since the latter half of the 19th century. Traditionally, farm forestry has played a dominating role in timber supply in Finland. Therefore, timber stumpage markets have been more competitive than in most other countries and consequently, both the stumpage and wage incomes have had more equal geographic and functional distributions than in the other sectors (Palo and Uusivuori 1999, Palo 2003).

Forest Industry Exports per Capita and the Share of Total Exports in 2001

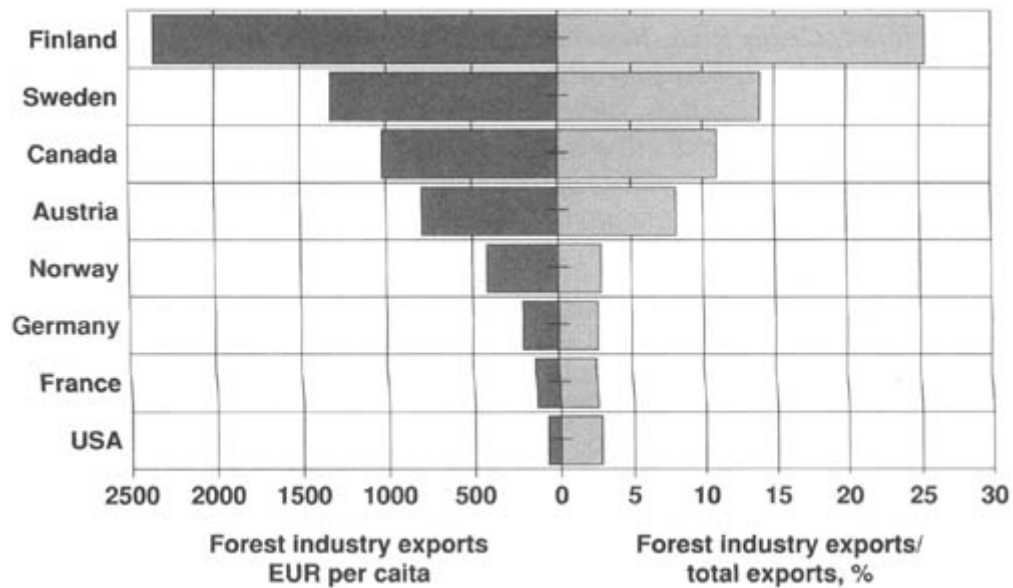


Figure 1. Forest industry exports per capita and the share of total exports in eight leading exporting countries (source: Paperinfo)

The forest conditions in the tropical world are different from those in Finland in many ways, but it may be worthwhile to contrast the evolution of the Finnish forest cluster and its impacts on reduction of poverty with those in the tropical countries. If surprising to some readers, this comparison follows the idea by John Stuart Mill, the 19th century British classical economist and philosopher: by comparing some phenomenon in its minimum and maximum we may improve our understanding of this phenomenon.

The seminal paper on “The role of forest industries in the attack on economic underdevelopment” by Jack Westoby (1962) aimed to create welfare/eradicate poverty by developing forestry and forest industries as growth poles for entire economies via a number of linkage effects. This theoretical framework served as guidelines for FAO forestry development projects for about 15 to 20 years with weak success (Figure 2, Westoby 1978, Palo 1988). Westoby’s theory worked well in Finland (Wardle *et al.* 2003) but not in the tropics. Why?

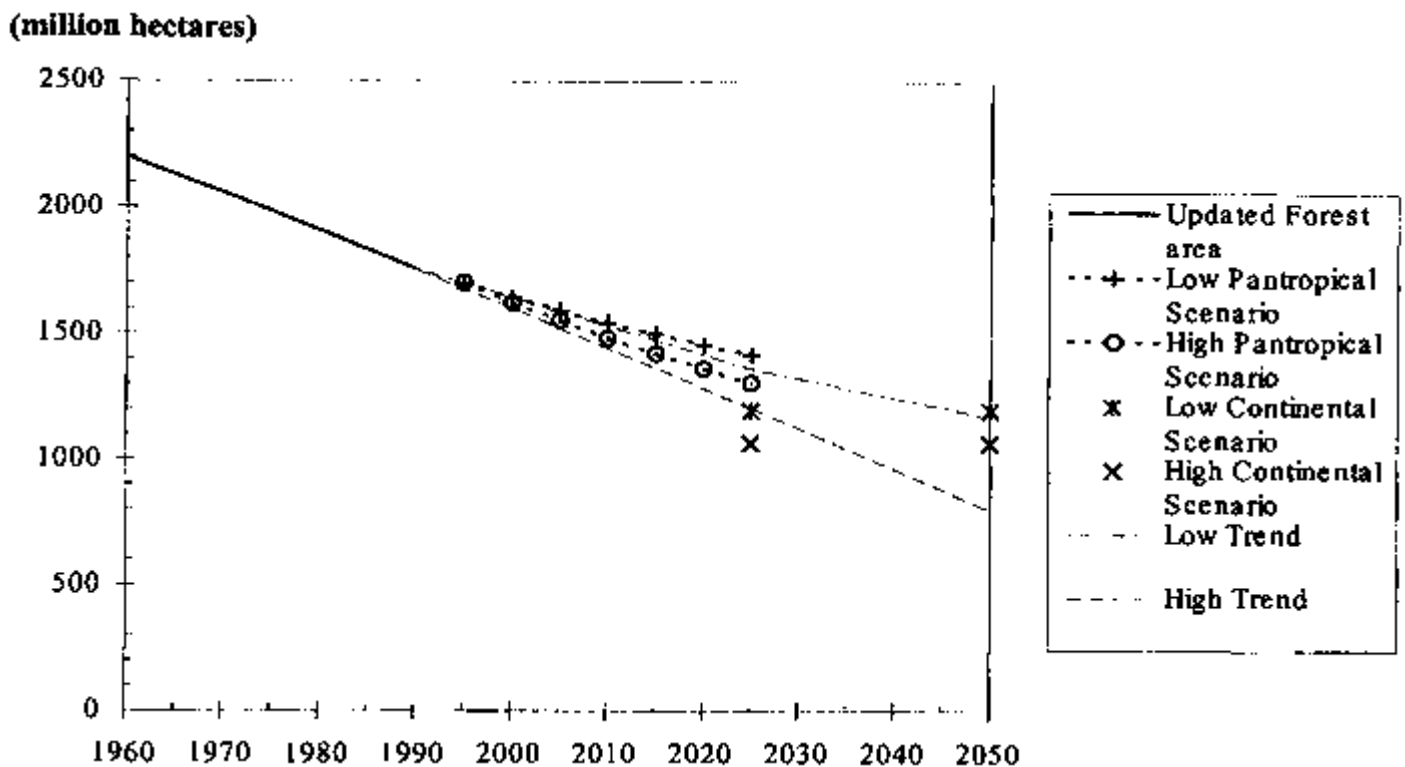


Figure 2. Declining natural forest area in the tropics 1960-2050. (Palo *et al.* 1999, Palo & Lehto 2000a)

This paper aims to respond to this question and the most essential question raised in the title. The first purpose is to describe the concept of poverty and its linkage with tropical forests. The second is to analyse the undervaluation and deforestation of tropical forests by corruption. The third is to analyse privatization and decentralization as relevant policy instruments to facilitate large-scale poverty reduction by tropical forests. Fourth, a description is given on how Finland has applied the five-capital approach in reducing poverty by forests. Finally, some discussion with some other country cases and conclusions are given.

An underlying hypothesis of this paper is that reduction of poverty by tropical forests is perhaps, after all, a new rhetoric or slogan, rather than a viable option, to cover the failures by the IGOs, NGOs and the various national governments and development agencies in slowing down tropical deforestation (Figure 2). Poverty reduction may be also a viable instrument to facilitate more external funding for forestry development projects.

The paper is restricted to study the linkages between poverty and all kinds of natural forests in 35-83 tropical countries at the national level. The number of countries in each analysis depended on the availability of data. The aim was to cover as many countries and as large an area as possible. In fact, in this way we can capture most of the poor people (World Bank 2001) and 70-95 percent of the total tropical forest area in the world (FAO 2001, Palo and Lehto 2003a).

POVERTY CONCEPTS

Poverty can be defined and measured in different ways (Scott 1981). The term income poverty refers to people with low monetary incomes. About 1.2 billion people out of 6 billion live on less than US\$1 a day. A half of all the six billion people on this earth live on less than US\$2 a day. A

clear reduction in the number of people living on less than US\$1 a day has lately taken place in East Asia and the Pacific. On the other hand, income poverty has increased clearly both in Sub-Saharan Africa and in South Asia (World Bank 2001).

Consumption poverty is a somewhat wider term than income poverty. The concept is widened more by including the multiple aspects of nutrition and food, health and education, empowerment of people and freedom of choice. Furthermore concepts like sustainable livelihoods and five-capital approaches have been introduced. The latter are composed of natural, human, social (political), cultural (physical) and financial capital. A success in poverty reduction is dependent access to all of the five kinds of capital (Hyden 1998, Smith and Scherr 2002, Angelsen and Wunder 2003). Accordingly, a theoretical deduction can be made, that in poverty reduction access to forests as one kind of natural capital alone can only play a rather limited role.

The World Bank (2001) has adopted a three-dimensional concept of poverty: opportunity, security and empowerment. Security refers to the risk of people falling below the poverty line or other welfare indicators. Empowerment means access and control over local resources, public services and influence in local decision-making. Opportunity includes income, education and health. Therefore it is quite similar to the Human Development Index by UNDP, which is composed as a simple average of life expectancy, education and GDP per capita indexes (UNDP 2003).

A case study on poverty and deforestation in Cameroon was conducted by Ekoko (1996). He also analysed the concept of poverty. His conclusion was that poverty does not necessarily lead to deforestation, and property rights for the poor not necessarily to forest conservation. However, these case study findings lack any power for generalization.

Angelsen and Wunder (2003) analysed the varying concepts of poverty. After a multiple of concepts they arrived at a definition of poverty as a subjective well-being. Their one conclusion was that at the end of the day, what matters is a person's own subjective assessment of well-being. Another conclusion on the different concepts was that ultimately the choice of the poverty indicator is dependent on the research context and goals, budget, duration and the specific need for comparative analyses.

Accordingly, there exist a number of poverty concepts available for our analysis. We are restricted in the use of a couple of objective concepts with readily available empirical measures, namely "income poverty" and "opportunity" in the meaning of the World Bank (2001). These are absolute poverty concepts. We shall not use any relative poverty concepts. On the other hand, we shall make our analysis at the national level. In this way we exclude the subjective and individual or household poverty concepts as well as a number of more multidimensional concepts, which we shall discuss to some extent only in the context of policy instruments applied in Finland.

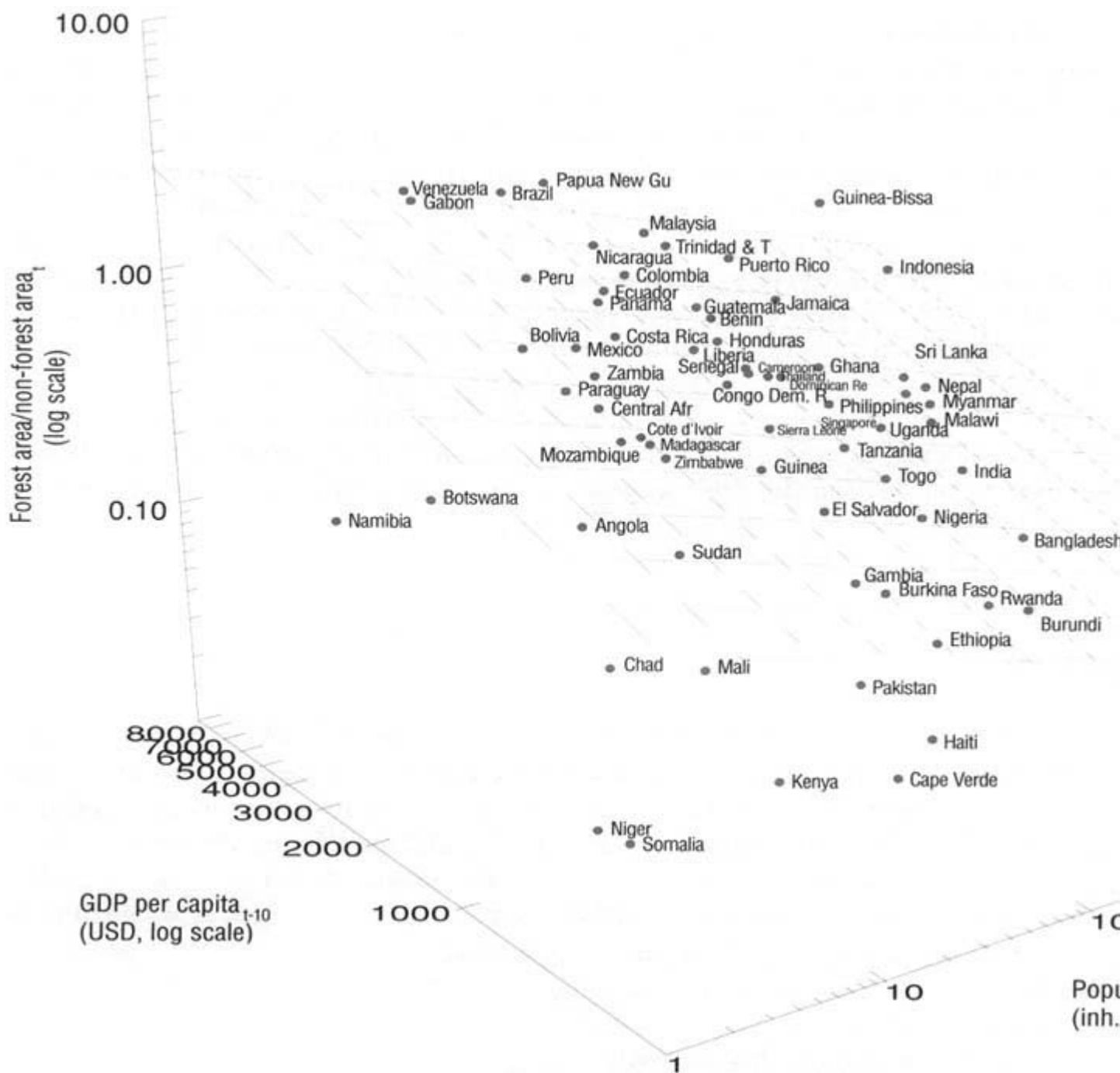


Figure 3. Relative forest area as a function of population density and GDP/capita in 71 tropical countries. Weighted adjusted R square = 0.24. (Forest areas from original inventory year data, t = random year 1970-1991; data sources: FAO FORIS 1995, NBER 1994)

POVERTY AND TROPICAL FORESTS

It makes also a difference which forest concept to apply in relation to poverty (Palo 1999, Angelsen and Wunder 2003). Here we shall use the concept of natural forests, which covers all kinds of other tree formations but plantation forests. Accordingly, rain forests, moist, semi-moist, semi-arid, arid, montane and cloud forests in the tropical countries are included. Forest and tree concepts of FAO/FORIS-database (Marzoli 1995) are applied.

“Human beings have always depended on forests. Initially, we used them as places to live. We hunted in them for game, foraged for fruits and nuts and gathered for fuel. Our relationship with our habitat was essentially no different than that of any other animal. The development of settled agriculture economies to replace those based on hunting and gathering required the clearing of forest.” (Drushka and Konttinen 1997, p. 17.).

We may conclude from this citation, that those forest people were, and still are in many corners of the tropical world, income poor but eventually consumption rich as long as the population densities are not too high in relation with the carrying capacity of the forest habitat. This refers to a situation of some importance still today, that income alone may not be a valid measure of poverty in the tropical world.

For this paper we made pilot modelling about the relationship of forest and poverty. Among 71 tropical countries relative forest area increased along with an increase in income per capita (Figure 3). But when forest areas are declining or deforestation is taking place in all of these countries, it is more rational to view the process from the opposite direction: at the national level increasing income poverty is reducing forest area. Population density is another independent variable applied in this simple model: also with increasing population density the relative forest area is reduced. Income poverty and population density jointly explain 24 percent of the variation of the relative forest area variable while weighted least square estimation (WLS) of the regression model is applied (see explanation in Palo and Lehto 2003b).

We measured the relationship of forest and poverty also as one dimension of the poverty concept by the World Bank (2001): opportunity or its close counterpart, the Human Development Index (HDI) by UNDP. HDI is a simple average of indexes on life expectancy at birth, combined adult literacy and school enrolment as well as local purchasing power parity of GDP per capita (UNDP 2003).

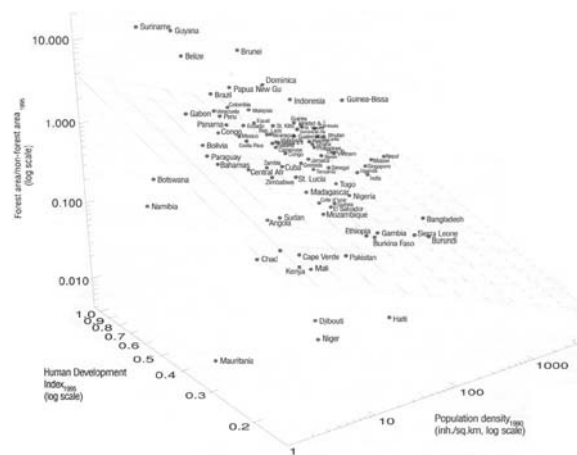


Figure 4. Relative forest area as a function of population density and Human Development Index in 83 tropical countries. Weighted adjusted R square = 0.43. (data sources as in Figure 3 & UNDP 1998)

In 83 tropical countries an increase of poverty by this measure also decreased relative forest area (Figure 4). HDI and population density jointly explained 43 percent of the variation of relative forest area. It is highly interesting that by replacing GDP per capita by HDI the degree of determination (the adjusted R square) was doubled. A wider poverty concept, “opportunity”/Human Development Index had a double explanation effect in comparison with the income poverty concept.

Also of special interest in this model is that it gives us a pan-tropical explanation over the three tropical continents.

Among 17 tropical Asian countries an even more fitting outcome from this kind of modelling was received (Figure 5). HDI and population density jointly explained 69 percent of the variation of relative forest area. The higher degree of determination in Asia than in the pan-tropics may be due to more homogenous ecological and cultural conditions in Asia than in the rest of the tropics. From our previous studies we know that the variation of ecological conditions measured with multiple variables is statistically highly significant (Palo *et al.* 2000, Uusivuori *et al.* 2002). The degrees of determination with these new two independent variable models were unexpectedly high in comparison with our previous studies.

We were able to control the above outcomes from two independent variable modelling with a seven independent variable modelling, where we applied three ecological variables and four socio-economic variables. The model explained 73 percent of the variation of relative forest area in 64 pan-tropical countries. The poverty variable of HDI was statistically highly significant (under 1 percent risk) and with an expected sign: the more poverty, the less relative forest. The other socio-economic variables were GNP/land area, external trade/GDP and agricultural productivity. All of them were statistically highly significant and with expected signs.

The message from our modelling about the role of poverty in relation to forest is not absolutely clear. The outcome is, however, unique and highly interesting for further studies. However, we may conclude that high poverty and low relative forest area at the national level are strongly statistically correlated. We may have here a vicious cycle as described by Dasgupta (1995). Higher population density at low level of income consumes more forest goods and services and increases deforestation, forest degradation and desertification. Poorer forest environment increases poverty, which in turn increases population density in the remaining forest and so on. This may be true especially under African and South Asian conditions. These countries represent about half of our pan-tropical data.

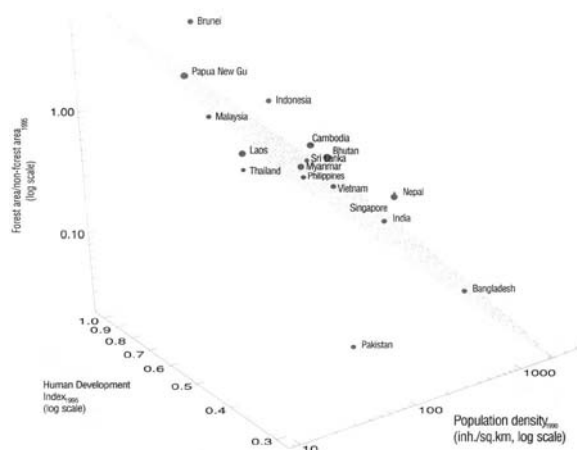


Figure 5. Relative forest area as a function of population density and Human Development Index in 17 Asian tropical countries. Weighted adjusted R square = 0.69. (Data sources as in Figure 4)

We try to avoid the impression that a poor marginal farmer is regarded, as a consequence of our modelling, as a cause of tropical deforestation. The late Jack Westoby, the well-known forest economist of FAO, used to say that this statement is equally true if an individual soldier is regarded as a cause of war. The local economic agents are striving for subsistence or profit maximization, but

they are primarily reacting to the economic incentives by the national governments and international markets. Accordingly, real causes of deforestation are the policy, economic, institutional, distributional and demographic factors underlying these local factors (Uusivuori *et al.* 2002).

“In the humid tropics the horizontal expansion of the different forms of agriculture (and animal husbandry) constitutes the most important direct overall factor, since it is responsible for nearly 85 percent of deforestation” (Lanly 2003, p. 79). The former head of the FAO Forest Resources Division in this citation fails to realize that the high opportunity cost of sustainable forest management is to a great extent due to the prevailing administrative underpricing of standing timber (Repetto and Gillis 1988, Treue 1994, Angelsen and Wunder 2003).

The artificially low value of natural tropical forest facilitates much wider clearing of forest for agriculture than would be the case under competitive market pricing of standing timber. Adopting local visible forest clearing agents as causes of deforestation is consequently a biased interpretation. Lanly (2003, p. 78) does report that the annual average tropical deforestation was estimated as 11 million ha in 1980, but he fails to report that it was estimated as 14 million ha in 2000 (www.fao.org). Otherwise, however, he is reporting trends from 1980 to 2000 by transfers between land cover classes and also distribution of deforestation in 2000 by continents in percentage.

In Finland shifting cultivation, deforestation and forest degradation were common during the 19th century. The Great Land Reform (Isojako) and the establishment of the State Forest Service and the College of Forestry in the middle of the 19th century supported the closing of open access to forests. Industrialization in Western Europe increased simultaneously the demand for forest products and raised the stumpage prices under clear and strong property rights and also labour incomes from forestry for the farm forest owners. Also the numerous landless people could benefit work incomes from forestry. Under poorly developed financing institutions of that time this forestry income had a key role in raising agricultural productivity. In Finland shifting cultivation and deforestation were closed down primarily as market driven processes with necessary juristic infrastructure: increasing value of forest lowered the opportunity cost of forestry and increasing agricultural productivity provided sufficient food from a smaller area than during the shifting cultivation era (Palo 2003).

Next we shall turn from the forest and the poor to the forest and the rich or elite, starting by considering the undervaluation of forest and especially the standing timber.

UNDERVALUATION BY CORRUPTION

Tropical deforestation is a complex, dynamic, multisector and multilevel phenomenon. The visible direct local actors of deforestation such as colonists, agriculturalists, shifting cultivators, cattle ranchers, fuelwood gatherers, industrial loggers and infrastructure developers are acting according to prices, taxes and subsidies or coercion applied by the national or international actors. The real causes of deforestation are underlying the local level. In order to slow down deforestation we have to deal with these underlying causes (Palo 2000, Palo *et al.* 2000, Uusivuori *et al.* 2002).

Naturally, the direct local actors of deforestation have their individual motivations and goals that may be called direct causes of deforestation. Profit maximization and survival are representative examples of such goals. In a brief way, we may state that tropical deforestation is continuing in a non-decreasing pace, because for such economic agents deforestation is more beneficial than maintaining natural forest cover or practising sustainable forest management. A low monetary value of natural forest is a key factor making the opportunity cost of forestry high.

Most tropical forests are owned by the state, in one way or another. The state has had the prevailing tendency to apply administrative pricing of standing timber or stumpage pricing at lower levels than the competitive price levels (Repetto and Gillis 1988, Treue 1994, Angelsen and Wunder 2003). In this way, the high opportunity cost of sustainable management of natural tropical forests is, at least partially, artificially made. We may ask why? After more than half a century of forestry development projects by the FAO, the World Bank, ITTO and other agencies, how and why this kind of undervaluation of tropical natural forests is continuing? When the private ownership is prevailing, like in Finland, the state forest service can get competitive price references from the private stumpage and timber markets.

We define socialistic forestry as forestry, where most forests in a country are state owned (Palo 1997). There seems to be a tendency under socialistic forestry to set stumpage prices low (e.g. Haley 2001) in order, *de jure*, to promote domestic industrialization, but, *de facto*, to facilitate a financing source for high profits of logging and often also of corruption. For example, in Indonesia during the times of President Suharto, his family, generals and concessionaires were in alliance to reap benefits from exploitation of forests (Kasa 1999). The corruption system has not collapsed in Indonesia with the removal of Suharto from the presidency. Similar corruption practices seem to flourish especially in the countries with ample commercial forest resources (FAO 2001).

Corruption can be defined as the misuse of public power for private benefit, for example bribing public officials, kickbacks in public procurements, or embezzlement of public funds (Lamsdorf 2001). Transparency International (www.transparency.org) has been integrating a Corruption Perception Index since 1995. Lately, 35 tropical countries were covered by this Index. Increasing corruption (declining of Corruption Perception Index) is decreasing relative forest area along with decreasing income/capita (Figure 6). Corruption and income/capita in a regression model behind Figure 6 are both statistically significant under 1 percent risk. They jointly explain 35 percent of the variation of relative forest area in 34 tropical countries. Corruption seems to be more rampant in poorer tropical countries.

We made also more integrated regression modelling with relative forest area as a dependent variable and with nine independent variables. Four ecological variables controlled the variable ecological conditions among countries. Corruption and four other economic variables were considered as underlying causes of deforestation. The nine independent variables explained 96 percent of the variation of relative forest area in 29 tropical countries with 69 percent of total natural tropical forest area. Corruption Perception Index had the highest elasticity among the five economic variables: a 10 percent decrease in corruption would increase relative forest area by 6 percent (Palo and Lehto 2003b).

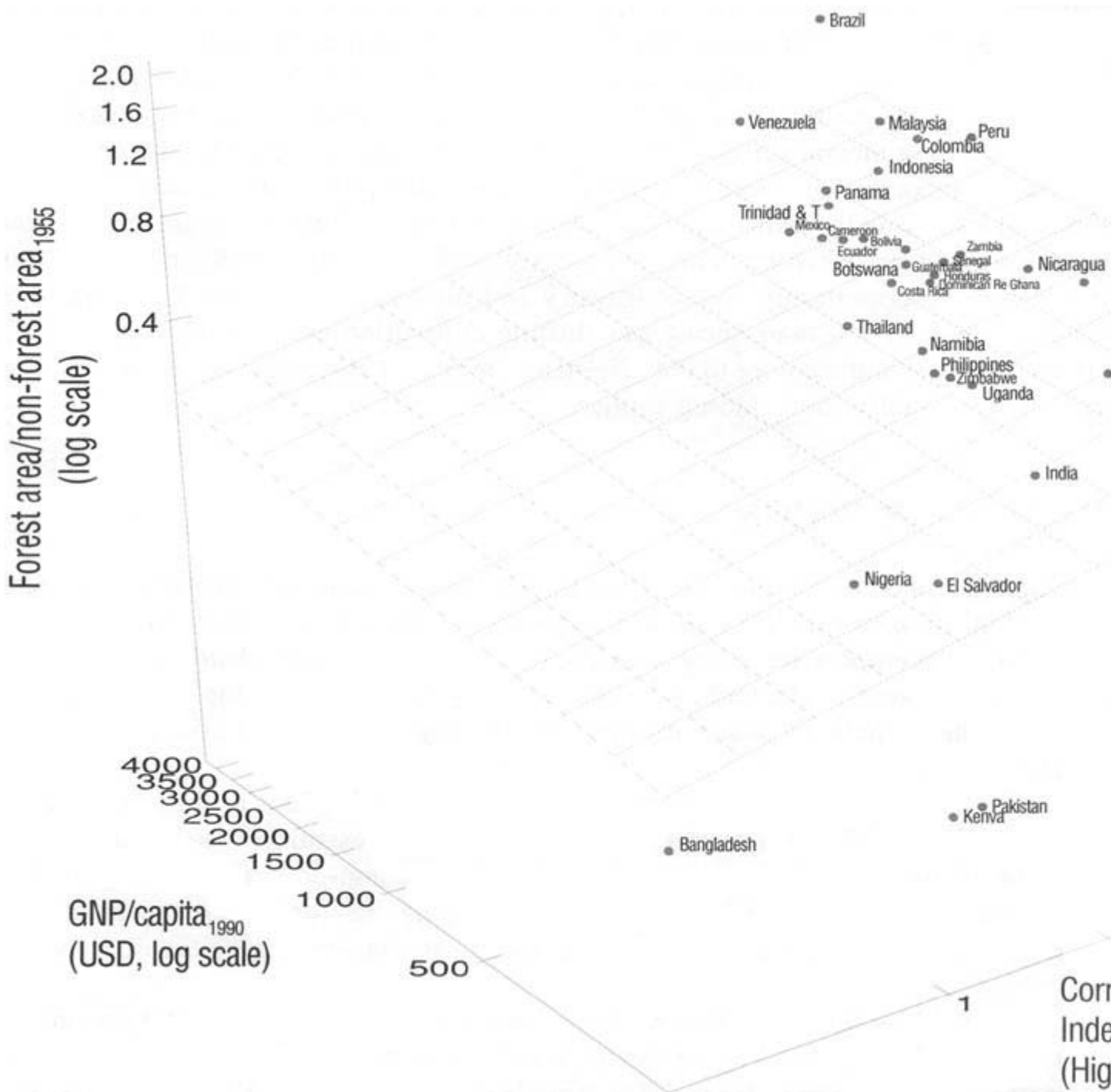


Figure 6. Relative forest area as a function of GNP per capita and Corruption Perception Index in 34 tropical countries. Weighted adjusted R square = 0.35. (Data sources: FAO 1999, Transparency International 2001, World Bank 1999)

We have only two principal means on how to control allocation, production and distribution of tropical forest resources in order to satisfy human wants for various forest goods and services: the public and private means (Figure 7). In the public route there are such instruments as laws, plans, budgets, taxes and subsidies. In the private route markets, contracts and traditions play the most important roles. Corruption tends to block both of these means by creating government failures and market failures (Wibe and Jones 1992, Bass and Hearne 1997, Palo 1997). This is the secret behind

continuously declining tropical forest area (Figure 2, 1980: 11 million and 2000: 14 million ha y⁻¹) despite all the global politics and rhetoric to stop deforestation (FAO 2001, 2003).

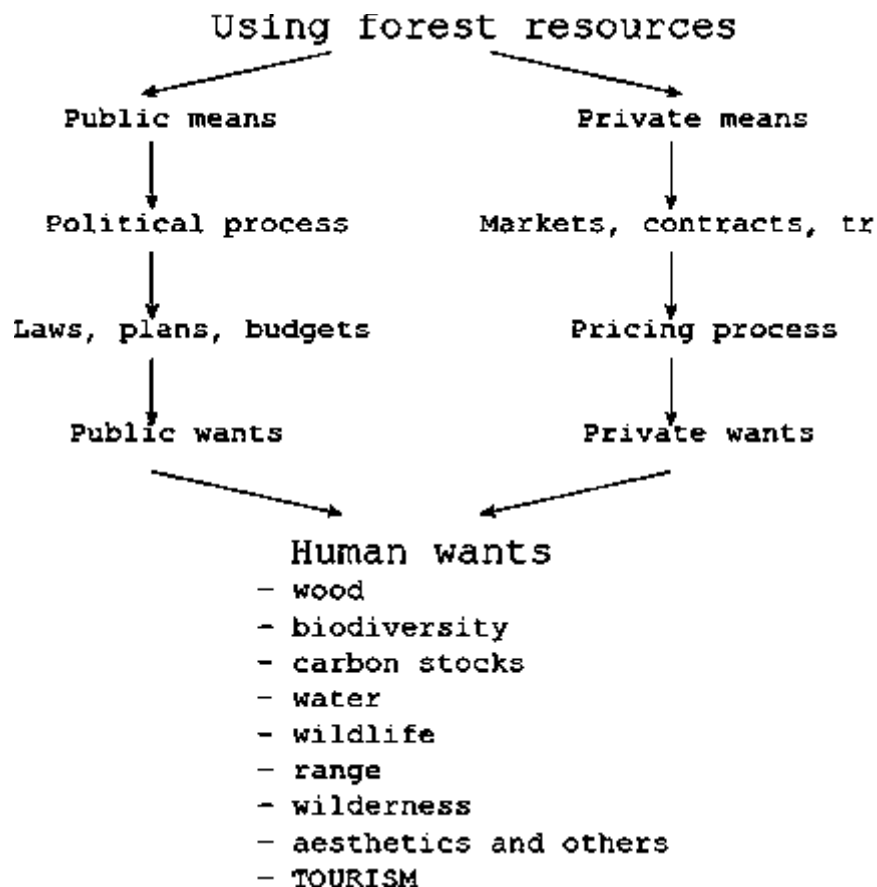


Figure 7. The two control systems of production, distribution and consumption of forest goods and services: the public means and the private means (Palo *et al.* 2001)

Our conclusion here states that combating corruption would be a key to revalue tropical natural forests at a competitive stumpage price level. Eliminating corruption would not be a sufficient instrument alone, but it would be an effective and necessary beginning. This would dramatically lower the opportunity cost of sustainable forest management and in this way save more forest also for poverty reduction. This transition could be an important initial process in the reduction of poverty by tropical forests. Surprisingly, in a great number of forest valuation studies (e.g. Wardle and Kaoneka 1999, Kristrom and Boman 2001, UNU 2001) the concentration is in non-timber products and services and the undervaluation of the most valuable forest product, timber (cf. Angelsen and Wunder 2003), is excluded.

An increased activity has lately taken place in the front of reducing or eradicating corruption (often covered by the term of “illegal logging”) in forestry (e.g. FAO 2001, Landell-Mills *et al.* 2002). A wide agenda may not be viable in this front, because corrupt governments are not willing to implement such wide agendas. A few selected measures in order to transform the corruptive culture via external funding and pressures would be more effective. Such instruments might include as follows (Palo and Lehto 2003b).

First, as a short-term measure, a nationwide information campaign could be launched in the schools, universities and via media to the public at large. The message of the campaign would tell all the

negative consequences of corruption in order to try and change the attitudes and eventually the corruptive culture (cf. FAO 2003):

Second, another short-term measure is to simplify forestry and marketing regulations, because in many tropical countries the system of public regulations and fees has been done by purpose into a complex one in order to facilitate more frequent points for corruption (cf. Smith and Scherr 2002, Angelsen and Wunder 2003).

Third, as a medium-term instrument adapt assessment of competitiveness of stumpage pricing in a market driven process of forest certification. This measure would create an incentive with external market and NGO pressures to neglect the administrative pricing system (Palo 2000).

Fourth, another medium-term instrument would be to improve forest research, statistics and forest monitoring systems in order to have valid, reliable, transparent and timely follow-up of the changes in forest ecosystems, in forestry, forest industry, in the markets and policies (cf. Wardle 2003).

Fifth, a demanding long-term instrument would be to privatize and decentralize forest resources (cf. Hyden 1998, Smith and Scherr 2002, FAO 2003, see below).

Implementing these five instruments would provide an effective beginning in combating corruption and deforestation as well as mobilizing a large-scale poverty eradication in the tropics. An integrated approach in all sectors of economy would produce even better outcomes in combating corruption.

Finland was assessed by Transparency International in 2001 and 2003 as the least corrupt country among the 102 and 133 countries included in the report (www.transparency.org). By reviewing the historical evolution of forestry in Finland, we do not find any period when corruption in forestry had played as negative role (Palo 2003). In some other industrialized countries such as the United States of America and Great Britain, corruption in forestry was a real problem 100-200 years ago (Albion 1926, Pinchot 1949).

When Finland had in the past practically no corruption, it was possible to avoid the worst government and market failures. In fact, these failures block the effectiveness of the two control systems, public and private means (Figure 7), in allocation, production and distribution of forest goods and services in the contemporary tropical countries.

Next, we introduce some of the policy reforms we consider as necessary in order to eliminate corruption and to facilitate a large-scale tropical forest-based poverty reduction scheme.

PRIVATIZATION AND DECENTRALIZATION

As we have shown above forests and poverty are strongly correlated. Less forest at the national level in the tropics means more poverty (Figures 3-5). Most likely, slowing down deforestation would be beneficial for poverty eradication. However, according to our analysis (Figures 6-7), in order to slow down deforestation, first corruption has to be combated. Our long-term policy proposal above to combat corruption was privatization and decentralization of state forests.

The Clean Development Mechanism CDM of the Kyoto Protocol identifies reforestation and afforestation as relevant forestry measures for application. Prevention of deforestation projects is not presently eligible under CDM. Via CDM new funding from industrialized countries to tropical

forestry is feasible, when the Protocol will become ratified. Some local poverty reduction in this way may be a viable option, but no large-scale poverty reduction is likely to occur under prevailing socialistic forestry in the tropics (cf. Smith and Scherr 2002.).

In order to slow down deforestation and to facilitate effective poverty reduction by reforestation and afforestation open access to forests has to be closed by property rights (Figure 8). Along with economic development, until a certain threshold point of time, natural forests will continue to decrease. In the case of strong and clear property rights and closed access to forests the stumpage prices (prices of standing timber) will start to increase, when economic scarcity of timber has appeared. The rising real stumpage prices give the profit-making motivation to the property rights holders and they start to plant more trees.

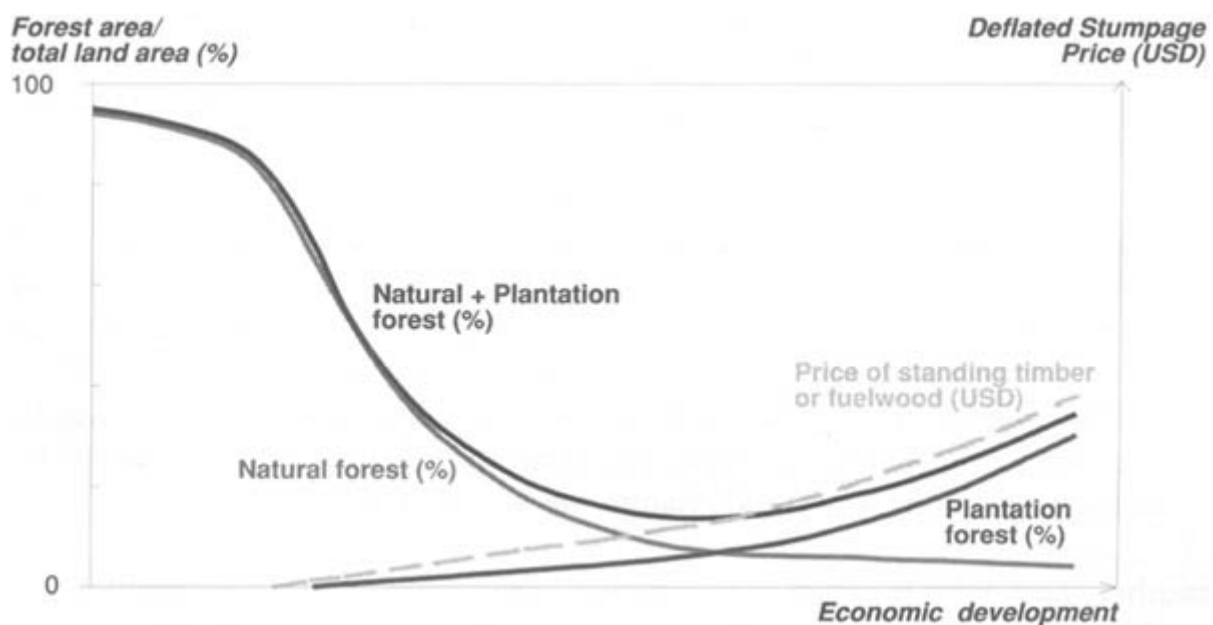


Figure 8. From deforestation to transition via markets-a model (Palo 2000)

The efficient property rights structure is universal, exclusive, transferable and enforceable. Universality means that all resources are privately owned. Exclusivity refers to a situation where all benefits and costs accrue only to the owner. Transferability means that property rights are transferable from one owner to another on a voluntary basis. Enforceability refers, finally, to a situation where property rights are secure from involuntary seizure or encroachment by others (Bromley 1991, Zhang 2000).

We introduce next one empirical graph indicating how total forest area (natural plus plantation forests) is correlated with income per capita-an empirical response to Figure 8. Among 166 countries we may find some empirical support for the key role of the private property rights (Figure 9). Here a U-shape distribution of countries can be observed. If Ireland is considered as the bottom of this U-shape, above and right from it there lie 19 countries. Among them only Brunei and Canada practise socialistic forestry. In the other 17 countries private forest ownership is prevailing. We found further empirical evidence of the existence of this U-shape distribution among 67 tropical countries with multiple regression modelling (Uusivuori *et al.* 2002).

Establishment of property rights can be a complex and slow process; at least this was the case in the past. In Finland the Great Land Reform (Isojako) was mobilized in the 1770s and it lasted about 150

years to cover all of the country. The aim was to delineate private fields and forests out of the state domain and the commons both in the terrain and in the official files. As a consequence already by the middle of the 19th century private forest ownership began to dominate in Finland.

A poor country has not perhaps adequate funding available to cover the transaction costs needed for this kind of land reform. Here exists a vital option for the ODA and other external funding. Transaction costs are composed of costs accruing from closing of open access and marketing costs. *Ex ante* costs of closing access derive from defining the property rights in the terrain and in the official files. *Ex post* costs of closing access, on the other hand, are due to protecting the property rights. Marketing costs are composed of marketing intelligence, buyer identification, marking of trees, tendering and business negotiations, scaling of timber and making the exchanges (Coase 1937, Zhang 2000).

Major problems may be encountered in implementation of this kind of land reforms. First of all, the political will of the government to allocate the state forests to private hands may be missing due to corruption. Second, if a land reform is executed under corruptive conditions a total failure may result as many experiences from Latin America indicate (Laarman 1996). Accordingly, first corruption must be eradicated to a workable level and then the implementation must be guided by a fair and democratically based strategy of privatization (Hurskainen 1996). The strategy, as a minimum, should define, who are eligible people for getting forest from the state, on which terms, under which schedule, under which kind of implementing organization, and under which kind of further regulation of forest management and logging activities.

Privatization of state forests has been an expanding process since 1990, especially in the countries with economies in transition nearly everywhere but not in Russia (FAO 1997, Zhang 2000). Some privatization of plantation forests has also taken place in such countries as New Zealand, the United Kingdom, Republic of South Africa and Australia. If privatization and decentralization are based on economic theory, then the extent of market external effects, externalities, is decisive on how far and how to proceed (Bass and Hearne 1997).

The forests without remarkable externalities fit best for private property rights. Forests with local externalities such as local watershed, landscape or biodiversity impacts fit best to be decentralized to local communities. Finally, forests with national externalities should be left in the hands of the national government. Usually, these forests are in the minority of the total forests and thus state forestry or conservation of forests in this situation is not considered as socialistic forestry. The degree of privatizing socialistic forestry depends thus on the context of the environmental and socio-economic conditions of the country concerned. A dogmatic ideological neo-liberal orientation should be avoided. Rather an optimum mix of markets and policies should be strived for (Figure 7, Stieglitz 2003, Palo *et al.* 2001).

Decentralization of forests from the national government to the local governments or communities has been practised lately on an expanding scale (Landell-Mills and Ford 1999, FAO 2003). It may be a step forward from a socialistic forestry system in the way that open access is easier to close down, when the local community is motivated to watch and implement it. A major risk in decentralization under corruption is to decentralize, not only forests, but also the corruptive culture.

On the other hand, community ownership is missing one important market, the market of forest holdings, which under the private property rights is feasible to create. This market has been operating in Finland for more than a century but from 1925 to 1996 under some state regulation. In recent years this market has been fully liberated. Lower personal motivation in community forestry

makes it also inferior to family forestry. Mexico with 77 percent of community forests for nearly a century and Papua New Guinea with 99 percent of community forests also for a long time provide cases, which indicate, that decentralization in this way cannot always be successful (cf. Angelsen and Wunder 2003).



Figure 9. Total forest area (natural and plantation forests) divided by total land area as a function of GNP/capita in 166 countries (Palo 2000)

The competitive forest holding market plays an important role for the intensification of forest management, because it shortens the time horizon of investments with otherwise long maturation

times (in Finland 60-150 years). When tending of a seedling stand or pruning of standing trees is accomplished, the owner can take the increased value of the holding either by selling the holding or in the form of increased value of the holding as a collateral, while borrowing money. The system of allocating only use rights to the local people, but the government remaining the owner of land, such as implemented in plantation forests in China (Zhang 2000), suffers from the same reason. Accordingly, community forestry seems to miss one key market, namely forest holding market, in support of sustainable forest management.

Reducing poverty by tropical forests and especially via the CDM of the Kyoto Protocol provides new options, but may be rather time consuming in order to safeguard expected results on any larger scale. First corruption has to be reduced, land reforms carried out and a number of market supporting juristic and information infrastructure created. Implementation of such projects can provide labour income and with some use rights and also some sales income, but the full arsenal of the market system, which has eradicated poverty in Finland in a national scale, is still missing in the tropics. Next, we shall take a closer look at the evolution of this system in Finland.

FIVE-CAPITAL APPROACH IN FINLAND

Without a continuous economic growth any major poverty reduction is not feasible. However, a delicate issue remains on how the welfare would trickle down to the poor? “Sometimes growth helps the poor, sometimes not. There are policies that in the long run may enhance growth and reduce poverty, such as enhancing education opportunities...” The countries in East Asia have promoted simultaneously growth and equity. Therefore, they provide illustrative cases of the effectiveness of this strategy (Stieglitz 2003).

History may not know any country where a remarkable poverty reduction has taken place via a voluntary action by the elite class. The poor have to take the economic and political power in order to change the income distribution to reduce poverty. The idea of sustainable livelihoods and the five-capital/assets approach (Hyden 1998, Angelsen and Wunder 2003) may be helpful to understand the operation of this process. The framework for action by the World Bank (2001, p. 37) reads as follows: “To attack poverty requires promoting opportunity, facilitating empowerment, and enhancing security-with actions at local, national and global levels. Making progress on all three fronts can generate the dynamics for sustainable poverty reduction.”

In Finland the real income per capita as a precondition for poverty reduction has grown to 16.5 times in the 85 years since final independence (the volume index of GNP/capita 0.4 in 1917 and 5.8 in 2002, when 1938=1: personal communication by Riitta Hjerpe, University of Helsinki). In the early 20th century Finland was predominantly an agrarian society, and poverty was mainly located in the rural areas (www.tilastokeskus.fi).

Human capacity building was then expanded in the form of compulsory primary school to cover the whole country. University education was considerably expanded and intermediate education mobilized, e.g. for forest rangers and agrotechnicians. Human capacity building was also expanded by creating various civil society NGOs.

Finland has created this wealth primarily with the key role of exporting forest products. Even Nokia began as a pulp and paper company in 1870. In 1984 it sold out all its forests as well as pulp and paper mills and changed its strategy towards electronics and mobile phones. The share of forest products from the value of all the commodity exports varied in Finland between 70 and 90 percent from 1920 to 1960. Afterwards the share declined (Figure 1) due to diversification of the economy,

although the volume of forest products exports has remained on a continuously increasing trend (Palo 2003).

For a small economy like Finland exports play a key role in economic growth. Finland has relied on this strategy of export-lead growth. Westoby's (1962) theory of forest industries in the attack of underdevelopment has found strong empirical support in Finland (Wardle 2003), but it is difficult to find any tropical country with similar development. Of course, forest industrialization in Finland started towards the end of the 19th century, when no globalized forest industry corporations existed. The technology was then also relatively simple. It was possible for the corporations not only to process timber, but also start manufacturing the machinery needed in timber processing and logging as well as to expand into related consultancy, research and development areas. Gradually a strong forest cluster was created (Palo 2003).

Finland has today 20 million ha of forests, which cover 66 percent of the national land area. Private families own 61 percent of the total forest area and private corporations 9 percent. Accordingly, a total private ownership of forest area covers 70 percent of the national forest area. The state has 25 percent and the remaining 5 percent is owned primarily by communes and the church parishes. However, the private families make up 85 percent of the commercial timber supply of 54 million m³ y⁻¹ and about 90 percent of stumpage income. The growing stock of timber is today at about the same level as it was two centuries ago in spite of large-scale exploitation of timber for two centuries (Figure 1). The growing stock is still projected to increase until 2030 (METLA 2003, www.metla.fi).

The share of family ownership of forests has been increasing over the long-term, also due to several land reforms favouring farmer ownership, which prevailed until recently. Urbanization and ownership transition through inheritance have lately left the farmers in a slight minority among the family forests.

The farmers and farmer forest owners organized themselves in a strong political party (Maalaisliitto/ Keskustapuolue) nearly a century ago. This party was able to seize remarkable political power starting in the 1920s. The current (October 2003) Prime Minister of Finland, Mr Matti Vanhanen, comes from this party. On the other hand, workers in the forest sector along with other workers established their own political party, a Social Democratic Party (Suomen Sosialidemokraattinen Puolue) a century ago. That party has also been surviving strongly and has been supporting the well-being of forest sector workers. Accordingly, the poor in Finland have been able during about a century to capture enough social and political capital for reduction of poverty from forest resources.

The farmers started simultaneously with their political mobilization to reap also economic power by establishing the Farmers Union, MTK, and a number of cooperatives in processing food and forest products and in retailing. The labour established even somewhat earlier various labour unions and also cooperatives in processing and retailing. Both kinds of unions are surviving very strongly as well as the main part of the cooperative movement. For example, family forest owners are the main owners of M-Real forest product corporation, which by turnover is the third largest in Finland and fourth largest in Europe. Human capital building jointly with social and political capital building helped the poor reap a remarkable share of economic power in a century in Finland.

The natural forest capital increasingly in the hands of farmers in Finland for a century also facilitated an increase in agricultural productivity as explained above. Increasing income flows both from forestry and agriculture facilitated creation of two primarily farmer-based banking systems: a saving bank system and a cooperative banking system. Both were established as local banks but

eventually they created two strong central banks to coordinate their financial operations. In this remarkably successful way the poor were able to create easier access to financial capital. The two systems were essential ones in reducing poverty until the 1960s, when processing industries and services along with urbanization surpassed employment in the primary industries.

DISCUSSION

I defined the title of this paper following considerable thought as: “Poverty reduction by tropical forests: rhetoric or a viable option?” It is now time to respond to this vital question.

Why has the Westobian theory (Westoby 1962) obtain empirical support in Finland and not in the tropics? It may be so, that the necessary implicit preconditions, such as closed access to forests, strong and clear private property rights and absence of corruption, absence of major government and market failures, have existed in Finland but not in the tropics. When openness of a country to external trade increased in Finland, it has supported both economic growth and sustainable forest management.

On the other hand, in the tropics an increase in the openness of a country to external trade has increased deforestation (Palo and Lehto 2000). No “invisible hand” in the form of increasing real stumpage prices as a market-based brake has appeared along with advancing deforestation (Figures 2, 8, 10). When the value of the decreasing remaining tropical forests has not been increasing, no financial incentive for intensification of sustainable forest management has appeared. Additionally, too often the financial capitals have flowed abroad or to luxury goods by the elites benefiting from timber exploitations, instead of investments in domestic forest plantations or timber processing.

The FAO transited from export-led or import-substituting forest industrialization paradigm towards community and social forestry in the later part of the 1970s and 1980s, as did also the World Bank (Palo 1988). The mission of community and social forestry was to attack economic underdevelopment /poverty not through the top-down as in the Westobian approach but through the bottom-up strategy. So far, we have not seen any remarkable large-scale poverty reduction via community and social forestry. Why? Maybe no integrated theoretical framework supporting them has been developed far enough. Theory at its best is very practical: it can guide research and policy in the face of complex processes like poverty reduction by forests. Action without guidance of relevant explicit theory will remain ineffective. Human actions are mostly guided by theories, but often in an implicit way.

Poverty reduction on a large scale by the tropical forests, we believe, will stay as rhetoric as long as no integrated theory exists to indicate the operational steps to be followed. “Sustainable livelihoods approach combined with governance” process as described by Hyden (1998) for the UNDP is one worthwhile candidate in this front. In fact, we have implicitly adopted an approach close to that in this paper. This recap is, however, strong: to advance stable and democratic governance. Such recap has earlier been considered as a radical engagement into the internal affairs of the national governments, if not even revolutionary. Hyden (1998) regards that supporting effective “governance” or changing the rules of the politics to favour the poor is a fitting approach for UNDP experts and consultants.

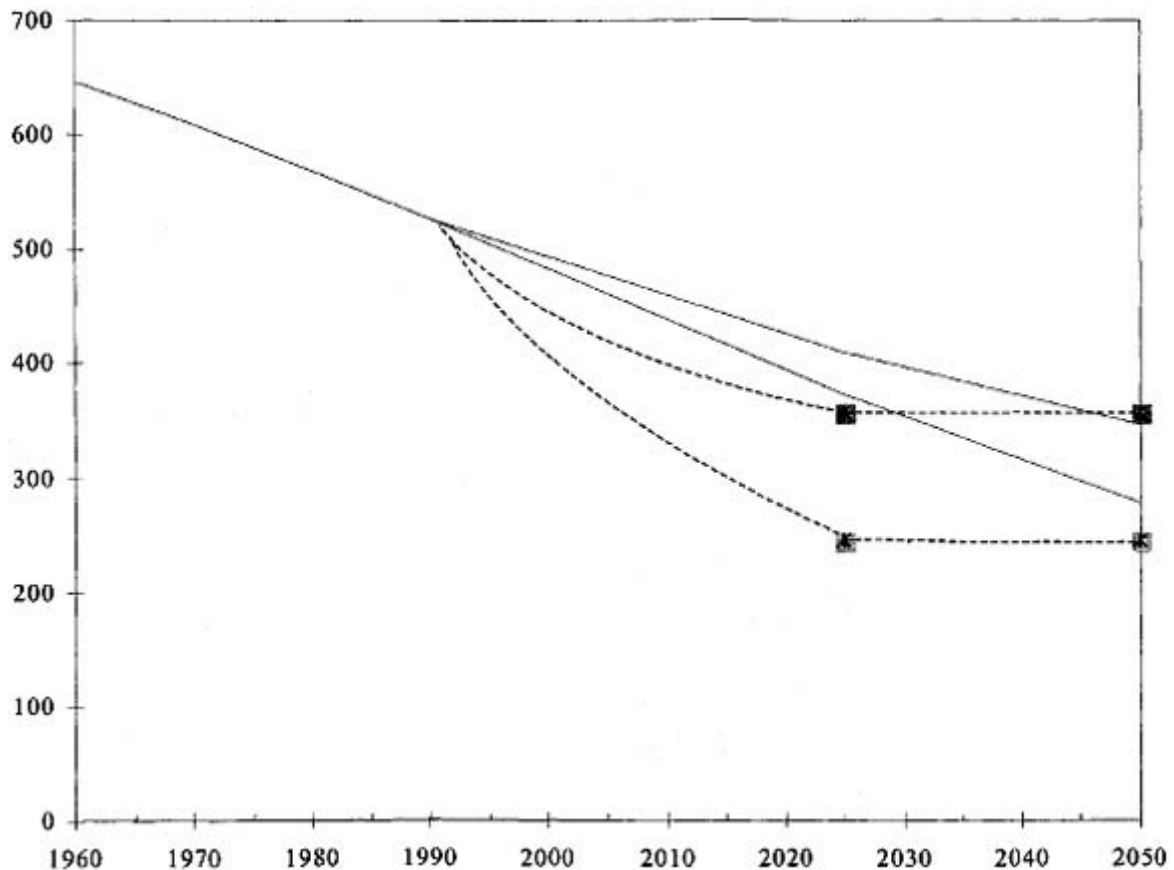


Figure 10. Declining natural forest area in tropical Africa 1960- 2050. In the scenarios until 2050 the solid lines indicate low and high trend scenarios and the squares with broken lines low and high regression model-based scenarios (Palo and Lehto 2003b)

In fact, UNDP (2003) was supporting this approach and has been quite radical already for 13 years by publishing most sensitive national data about the progress of human welfare. What about agencies that have been more concerned with tropical forests, such as FAO, the World Bank and ITTO? No similar publishing of national progress in sustainable forest management or forest-based development has taken place. Maybe the UNDP is by its organizational structure closest to the UN mainstream ideology?

As long as “socialistic forestry” paradigm is prevailing in this world, we cannot see any chance for a large-scale reduction of poverty by the tropical forests. I wrote an article “No sustainable forestry without adequate privatization” (Palo 1997), where I introduced and defined the term “socialistic forestry”. As a conclusion of this analysis I may revise that title to read as follows: “No large-scale poverty reduction by the tropical forests without large-scale devolution of socialistic forestry”.

Why have the IGOs and NGOs presently adopted the rhetoric of poverty reduction? For decades global and other international politics have failed in stopping deforestation (Figure 2). There is a good reason to cover this failure by introducing a new rhetoric as has happened already since the 1960s by shifting from forest-based industrialization to community and social forestry. Another potential explanation is that when the rhetoric is up-to-date (according to the UN Millennium Development Declaration), the agency has better chances to get more external financing for forestry development projects of various kinds with a poverty hat.

We may conclude here, that poverty reduction by the tropical forests will remain as rhetoric at least for some decades to come, if no radical change in the strategies and their implementation take place. We have indicated in this paper with empirical evidence, that decreasing forest area and increasing poverty are strongly correlated, especially in the 17 tropical Asian countries (Figures 4-5). Our scientific scenarios show a continuous decline of tropical forests at least until the 2020s (Figure 2). During the same time 29-44 percent of the Asian tropical forests will be deforested. These findings are based on two scientific articles (Palo *et. al.* 1999, Palo and Lehto 2000a). A third article indicates that about half of the African tropical forests may be lost by the 2020s (Figure 10, Palo and Lehto 2003c). When most of the poor reside in tropical Africa and tropical Asia, these scenarios undermine seriously the ambitious goals of poverty reduction by the UN and its family members.

We may have another conclusion as good news: a visible rhetoric plays a positive role in the world politics. A number of positive past global achievements by the UN has been identified (UNDP 2003, p. 31). It can be regarded as an achievement that poverty reduction by the tropical forests is included in the world political agenda, but it is not a sufficient advancement. Under continuous deforestation and socialistic forestry no real advancement in a large-scale reduction of poverty is registered. What makes the bad news? After changing the rhetoric each decade, from forest-based industrialization to community forestry, to social forestry and to poverty reduction, an impression is given to the media and the public at large, that each rhetoric/agenda has been effectively implemented. This paper serves the purpose of mobilizing an evaluation of the accomplishments of these varying agendas.

However, in order to avoid too pessimistic a view, it may be worthwhile to introduce some other positive country cases. Costa Rica may today be the only tropical country which has been able to stop deforestation - with 2 million ha of remaining forest, which cover 38 percent of the land area of 51 000 km² and a population density of 77 inhabitants km⁻². The Republic of Korea provides another interesting case with 6 million ha of forest, which covers 63 percent of the land area of 98 000 km² and a population density of 471 inhabitants km⁻². Sweden and Japan as major forestry and forest industry countries have maintained high forest covers, are practising sustainable forest management and have reduced during the past hundred years poverty by forests in remarkable degrees (FAO 2003).

In fact, this combination of both high forest cover and population density makes Korea a unique case among 197 countries in the world (Palo 2000). Costa Rica and Korea exhibit illustrative cases along with Finland of the effectiveness of land reforms, privatization of forests, economic growth and advancements in democratization and removal of corruption (www.transparency.org) in support of sustainable forest management. Costa Rica, on the other hand, provides illustration, on how commercialization of forest services, e.g. carbon sequestration, biodiversity and ecotourism, can bring additional benefits in the reduction of poverty by tropical forests.

Malaysia in tropical Asia, and especially Peninsular Malaysia, provides an illustrative case, on how large-scale deforestation of natural forests into rubber and oil palm plantations has created sustainable development but mostly outside forestry. Both logging and timber processing have been in the domestic hands, which has increased the impact on income sustainability. The long-term stability of the government, relatively low corruption, and the income distribution policy in favour of the poor have been other factors in advancing sustainable development. However, maintaining of socialistic forestry has undermined intensification in sustainable forest management. As a consequence, some options in poverty reduction by forestry have been missed. But Malaysia is still distinguished in the advancement of poverty reduction in comparison with the neighbouring

countries, e.g. Indonesia and the Philippines (UNDP 2003, p.198). In both these countries rampant corruption and unstable governments have undermined, not only the past but also, the future prospects of poverty reduction by the tropical forests.

It is interesting that Costa Rica, the Republic of Korea, Sweden and Japan have applied, to a great extent, a similar five-capital approach as we have described above in the illustration of the evolution of sustainable forestry and poverty reduction by forestry in Finland. No doubt, more of both theoretical and applied research are needed in support of poverty reduction by the tropical forests (cf. Angelsen and Wunder 2003). On the other hand, no more research findings are needed in order to change the implementation strategies and policy instruments with their effective implementation of national and international agencies active in this front. A viable option to transit from rhetoric in effective reduction of poverty by the tropical forests is already described in this paper.

ACKNOWLEDGEMENTS

I wish to acknowledge my colleague Erkki Lehto in Helsinki for his expertise and computations in creating the new and old figures of this paper. My acknowledgements are also extended to my colleagues Dr Jussi Uusivuori of Metla, Finland, and Dr Yaoqi Zhang of Auburn University, the United States, for reviewing and commenting on the draft. My special thanks to the editors for the language checking and copy editing of this paper. I also feel indebted to Professor Yeo-Chang Youn for inviting me to this Workshop, as well as to him and my other fellow speakers by whom I have learned and been inspired more about the Kyoto Protocol, CDM, Asian forestry and poverty reduction.

BIBLIOGRAPHY

ADB. 2001. Moving the poverty reduction agenda forward. In *Asia and the Pacific*. Manila, Asian Development Bank. 64 pp.

Albion, R.G. 1926. *Forests and sea power. The timber problem of the Royal Navy, 1652-1852*. Cambridge, USA, Harvard University Press.

Angelsen, A. & Wunder, S. 2003. *Exploring the forest-poverty link: key concepts, issues, and research implications*. Occasional Paper No. 40. Bogor, Indonesia, CIFOR. 58 pp.

Bass, S. & Hearne, R.R. 1997. *Private sector forestry: a review of instruments for ensuring sustainability*. London, IIED.

Bromley, D. W. 1991. *Environment and economy: property rights and public policy*. Cambridge, USA, Blackwell Publishers.

Coase, R. H. 1937. The nature of the firm. *Economica* 16: 386-406.

Dasgupta, P. 1995. The population problem: theory and evidence. *Journal of Economic Literature*, Vol. 33: 1879-1902.

Druska, K. & Konttinen, H. 1997. *Tracks in the forest. The evolution of logging machinery*. Helsinki, Timberjack Group. 254 pp.

- Ekoko, F.E.** 1996. *Poverty and deforestation*. UNU/IAS Working Paper No. 18. Tokyo, The United Nations University/Institute of Advanced Studies. 27 pp.
- FAO.** 1997. *Issues and opportunities in the evolution of private forestry and forest extension*. Rome. 163 pp.
- FAO.** 2001. *State of the world's forests 2001*. Rome.
- FAO.** 2003. *State of the world's forests 2003*. Rome. 151 pp.
- FAO/DFID.** 2001. *How forests can reduce poverty*. Rome. 25 pp.
- Haley, D.** 2001. Harvesting fees for public timber in Canada. In M. Palo, J. Uusivuori & G. Mery, eds. *World forests, markets and policies*. Volume III, pp. 407-409. Dordrecht/Boston/London, Kluwer Academic Publishers/ World Forests.
- Hurskainen, R.** 1996. *Privatization of public forestland. Towards solving the deforestation problem in Tanzania*. Helsinki School of Economics (Helsingin kauppakorkeakoulu). 136 pp. (Pro gradu thesis in Economics).
- Hyden, G.** 1998. *Governance for sustainable livelihoods: operational issues*. Paper commissioned by UNDP. (available at www.undp.org/sl/Documents/documents.htm).
- Kasa, S.** 1999. Political power and the Indonesian forest concession system. In M. Palo & J. Uusivuori, eds. *World forests, society and environment*. Volume I, pp. 204-213. Dordrecht/Boston/London, Kluwer Academic Publishers/World Forests.
- Kristrom, B. & Boman, M.** 2001. Valuing the multiple functions of forests. In M. Palo, J. Uusivuori & G. Mery, eds. *World forests, markets and policies*. Volume III, pp. 149-158. Dordrecht/Boston/London, Kluwer Academic Publishers/World Forests.
- Laarman, J.G.** 1996. *Government policies affecting forests in Latin America. An agenda for discussion*. Washington, DC, Inter-American Development Bank/Environment Division.
- Lambsdorf, J.G.** 2001. *Framework document*. Background paper to the Corruption Perception Index. Transparency International/Gottingen University. www.transparency.org/cpi/
- Landell-Mills, N. & Ford, J.** 1999. *Privatising sustainable forestry: a global review of trends and challenges*. London, IIED. 102 pp.
- Landell-Mills, P., Spears, J. & Gupta, A.** 2002. *Forest Integrity Network (FIN): Background and concept paper*. Transparency International. 10 pp.
- Lanly, J-P.** 2003. *Deforestation and forest degradation factors*. Congress Proceedings B, XII World Forestry Congress, pp. 75-83. Quebec City.
- Marzoli, A.** 1995. *FAO Forest resource assessment 1990. Forest Resources Information System (FORIS). Concepts and methodology for estimating forest state and change using existing information system documentation*. FAO, Rome.

METLA 2003. *Forest Finland*. Helsinki, Finnish Forest Research Institute. 45 pp.

Oksanen, T., Pajari, B. & Tuomasjukka, T. (Eds.) 2003. *Forests in poverty reduction strategies. Capturing the potential*. Proceedings No. 47. Joensuu, European Forest Institute. 206 pp.

Palo, M. 1988. The forest-based development theory revisited with a case study of Finland and prospects for developing countries. In M. Palo & J. Salmi, eds. *Deforestation or development in the Third World?* Volume II, pp. 13-156. Metsantutkimuslaitoksen tiedonantoja 309. Helsinki. Forest Research Institute.

Palo, M. 1997. *No sustainable forestry without adequate privatisation*. Communications of Skogforsk 48.18, p. 301-310. NISK/NLH. As. Norway.

Palo, M. 1999. What is forest - concepts and etymology. In M. Palo & J. Uusivuori, eds. *World forests, society and environment*. Volume I, pp. 12-13. Dordrecht/Boston/London, Kluwer Academic Publishers/World Forests.

Palo, M. 2000. Global prospects on deforestation and transition. In M. Palo & H. Vanhanen, eds. *World forests from deforestation to transition?* Volume II, pp. 3-21. Dordrecht/Boston/London, Kluwer Academic Publishers/World Forests.

Palo, M. 2003. Evolution of sustainable forest management in Finland with impacts of globalization. *Proceedings of the International Conference on Integrative Approaches towards Sustainability*. Baltic Sea Region taking the lead, pp. 60-69. Riga, University of Latvia.

Palo, M. & Lehto, E. 2003a. Modeling tropical deforestation and carbon scenarios. *Proceedings/TF1 Environmental change*. XII IUFRO World Congress, Kuala Lumpur.

Palo, M. & Lehto, E. 2003b. *Deforestation by corruption?* (unpublished).

Palo, M. & Lehto, E. 2003c. *African deforestation: causes and scenarios*. Proceedings B. XII World Forest Conference, Quebec City.

Palo, M., Lehto, E. & Enroth, R-R. 1999. Scenarios on tropical deforestation and carbon fluxes. In M. Palo, ed. *Forest transitions and carbon fluxes. Global scenarios and policies*. World Development Studies 15. Helsinki, UNU/WID

Palo, M., Lehto, E. & Uusivuori, J. 2000. Modeling causes of deforestation with 477 subnational units. In M. Palo & H. Vanhanen, eds. *World forests from deforestation to transition?* Volume II, pp. 101-124. Dordrecht/ Boston/London, Kluwer Academic Publishers/World Forests.

Palo, M. & Uusivuori, J. 1999. Forest-based development in Finland-A unique success? In M. Palo & J. Uusivuori, eds. *World forests, society and environment*. Volume I, pp. 300-318. Dordrecht/Boston/London, Kluwer Academic Publishers/World Forests.

Palo, M., Uusivuori, J. & Mery, G. (Eds.) 2001. *World forests, markets and policies*. Volume III. Dordrecht/ Boston/London, Kluwer Academic Publishers/World Forests. 490 pp.

Pinchot, G. 1948. *Breaking new ground*. Washington DC, Island Press.

Repetto, R. & Gillis, M. (Eds.)1988. *Public policies and the misuse of forest resources*. Cambridge University Press.

Scott, W. 1981. *Concepts and measurement of poverty*. Geneva, UN Research Institute for Social Development. 62 pp.

Smith, J. & Scherr, S. J. 2002. *Forest carbon and local livelihoods: assessment of opportunities and policy recommendations*. Occasional Paper No. 37. Bogor. CIFOR. 45 pp.

Stieglitz, J. E. 2003. Poverty, globalization and growth: perspectives on some of the statistical links. In *UNDP: Human development report 2003*, p. 80.

Treue, T. 1994. Evaluation of the Ghanaian timber royalty system. In F. Helles & M. Lindal, eds. *Scandinavian Forest Economics* 35, pp. 409-422.

UNDP. 2003. *Human development report 2003*. Millennium development goals: a compact among nations to end human poverty. Oxford. UK. Oxford University Press. 367 pp.

UNU. 2001. *Value of forest*. Tokyo, The United Nations University.

Uusivuori, J., Lehto, E. & Palo, M. 2002. Population, income and ecological conditions as determinants of forest area variation in the tropics. *Global Environmental Change* 12(4): 313-323.

Wardle, P. (Ed.) 2003. *World forests, society and environment. Executive summary*. Tokyo, The United Nations University. 53 pp.

Wardle, P. & Kaoneka, A. 1999. Perceptions and concepts of the importance of forests. In M. Palo & J. Uusivuori, eds. *World forests, society and environment*. Volume I, pp. 43-56. Dordrecht/Boston/London, Kluwer Academic Publishers/World Forests.

Westoby, J. 1962. *The role of forest industries in the attack of economic underdevelopment. The state of agriculture*. FAO, Rome.

Westoby, J. 1978. *Forest industries for socio-economic development*. Eighth World Forestry Congress. (FID/GS Jakarta).

World Bank. 1990. *World development report 1990. Poverty*. Oxford University Press. 260 pp.

World Bank. 2001. *World development report 2000/2001. Attacking poverty*. Oxford University Press. 335 pp.

World Bank. 2003. *Sustaining forests. A World Bank strategy*. Washington DC. 24 pp.

www.fao.org/forestry/fo/fra/main/index.jsp

www.metla.fi

www.tilastokeskus.fi

www.transparency.org

Zhang, Y. 2000. Deforestation and forest transition: theory and evidence in China. *In* M. Palo & H. Vanhanen, eds. *World forests from deforestation to transition?* Vol. II, pp. 41-65. Dordrecht/Boston/London, Kluwer Academic Publishers/World Forests.

^[3] Seoul National University, Seoul, Korea; E-mail: MattPalo@snu.ac.kr