MATTI PALO
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DEFORESTATION OR DEVELOPMENT IN THE THIRD WORLD? VOLUME II



METSÄNTUTKIMUSLAITOKSEN
TIEDONANTOJA 309

Kansantaloudellisen metsäekonomian
tutkimussuunta
Division of Social Economics
of Forestry

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METSÄNTUTKIMUSLAITOKSEN TIEDONANTOJA 309
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DEFORESTATION OR DEVELOPMENT IN THE THIRD WORLD ?

Volume II

Matti Palo & Jyrki Salmi

Helsinki 1988

ABSTRACT

The theory of forest-based development is revised and integrated into the staples and linkage theories. The effects of the forest sector on economic development in Finland are then described by applying this provisional comprehensive theory. During the past hundred years the exports of the Finnish forest sector correlated positively and strongly with economic growth. This simple statistical association is interpreted through a separate identification of the causal factors partly as a direct and partly as an indirect contribution by the forest sector to economic growth. The key role of income distribution on economic development was discovered. Finally, the applicability of this approach to developing countries is tentatively discussed. A few developing countries have penetrated the international markets for processed forest products, but the majority of such countries have remained outside the potential benefits of export-led, forest-based development. The precise formulation and empirical testing of the theory of forest-based development, especially where it concerns the developing countries, remain outside the scope of this first paper. The second paper focuses land reforms as means to check deforestation. In most developing countries economic development is problematic when landownership is extremely skewed and there are 'elitistic' characteristics in the structure of economy. In this kind of situation land reforms and broader rural reforms are needed. However, the land reforms are difficult to implement. Those methods that leave the final decision to the individuals, e.g. tax-induced land reform, might be politically more acceptable than the coercive ones. The increase in agricultural productivity and the overall economic growth and social development, caused by the land reforms, could contribute to nature conservation and especially to the survival of tropical forests.

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PREFACE

The ongoing research project "Deforestation and development perspectives in developing countries" produced its first report (No 272 in the same series) last year. The purpose of these two pilot publications is to serve as discussion papers in order to find out the appropriate approaches for investigating the problem of deforestation and development in the Third World. In this report an attempt is made to revise the theoretical framework of forest-based development (Part I) and to introduce a few proposals for effective policy means to decelerate deforestation (Part II).

I presented a draft version of Part I as a voluntary paper in the VIIIth World Economic Congress of the International Economic Association on "The Balance between Agriculture and Industry in Economic Development" in New Delhi, December 1986. Again in July 1988 I gave a paper on this topic in an international symposium on "Forest Sector Modelling" by The Finnish Forest Research Institute in Kerimäki, Finland. The original idea to initiate research in this front lies in my consulting work for FAO in four developing countries where I came into personal contact with the inhibiting problems surrounding the forest-based development and deforestation in the Third World.

The present research project has been financed jointly by The Finnish Forest Research Institute and The Academy of Finland. Jyrki Salmi left the project in the beginning of this year for joining FAO Forestry Deparment in Rome to act as an assistant to the Coordinator of The Tropical Forestry Action Plan. He assisted me in the statistical computations of my paper. Gerardo Mery and Ashley Selby perused and commended both of the manuscripts and Lauri Hetemäki the first one. Risto Heikkinen edited the manuscript for printing. Maija Kuusijärvi drew most of the figures and Eila Iltanen was responsible for the typing. The English language

was checked by John Derome. On behalf of our project team I wish to extend our gratidute to all the persons and organizations who contributed to the accomplishment of this report.

Gerardo Mery recently made a study tour to Chile and the next report of this project will give a comparative description of deforestation and development in Chile and Finland.

Helsinki, September 1988

Matti Palo
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FOREST-BASED DEVELOPMENT OR DEFORESTATION: AN OVERVIEW

Matti Palo

The primary topic of this volume is the potential of forest-based development, whereas deforestation was predominantly focused in the previous volume. Both volumes concern an on-going research project on "Deforestation and development perspectives in developing countries". This volume is composed of two parts:

- "Forest-based development theory revisited with a case study of Finland and prospects for developing countries" by myself, and
- "Land reform - a weapon against tropical deforestation" by Jyrki Salmi.

The first paper can be reviewed as follows. The export value of forest products, based on the industrial logging of natural and plantation forests, in all the developing countries amounted to USD 7-9 billion annually in 1980-1984. The large-scale nature of this business makes it even more difficult to control industrial logging operations. The logging contractors, when left on their own, tend to promote deforestation directly by wasting timber and via careless design and implementation of operations, but especially indirectly via opening previously inaccessible forest areas through logging road construction for shifting cultivators.

Some symptomatic problems in forest-based development are inherent in deforestation: decreasing future supplies of roundwood and fuelwood, and of export trade in forest products. The share of the export value of the developing countries out of the world total has declined from 18 % to 15 %, while the equivalent share of the import value has grown from 12 % to 19 % during 1973-1984. Accordingly, even the self-sufficiency of the developing countries has been declining. However, the value of the forest-product exports of the developing countries has doubled between 1973 and 1984, while that of the developed countries has grown by a

factor of 2,4. A few developing countries, such as Malaysia, Indonesia and Brazil, have penetrated the international markets for processed forest products, but the majority of such countries have remained outside the potential benefits of export-led, forest-based development.

The theory of forest-based development, as formulated by Jack Westoby in 1962 is revised by the present author on the basis of the staples and linkages theories. Although Westoby's contribution was strongly criticized later on, for instance, by Westoby himself in 1978 and by Douglas in 1983, the main ideas of Westoby's 1962 framework appeared to be functional in the light of this study. Westoby clearly underestimated the role of the agricultural linkage of the forest sector, while neglecting the analysis of fuelwood and the key role of functional income distribution.

Westoby (in 1962) quite correctly emphasized the potentials of the backward and forward linkages of forest industries. He considered wood as a versatile raw material that provides a potential for diversified forest industries. However, he did not recognize the final demand linkages like consumption and investments linkages which most likely have played a major role in the forest-based development of Finland.

A vital forest sector policy transformation took place internationally mainly during the 1970's. Along with income distribution and rural development (agricultural linkage) issues, environmental effects and dependencies were strongly emphasized. The likelihood of increasing deforestation along with expanding industrial logging in the Third World was anticipated by FAO early enough (in 1958). Westoby (in 1962) did not identify deforestation as a specific risk. Instead, he clearly pointed out the various "non-crop" utilities of forests or forest influences and stated that they were inseparable from forestry planning. Sartorius and Henle (in 1968) most clearly brought up the deforestation aspect in the policy discussions.

The pilot case study of Finland cover the years 1860-1982. The time series were certainly long enough for the various effects of the forest sector to become mature. Some relevant time series were lacking, as was especially the case with older input-output studies that had been helpful in identifying the development of the various linkages. The various hypotheses and reservations of the revised theory of forest-based development are preliminarily tested by analyzing such statistical data and the economic history.

The expansion and diversification of the Finnish forest sector is described. This development was especially promoted by the increasing demand for forest products and increasing supply of domestic roundwood, as well as by the versatility of wood as a raw material (forestry's forward linkages). During the hundred-year period from 1880 to 1980 the exports of the Finnish forest sector correlated positively and strongly with economic growth. This simple association was interpreted through a separate identification of the caused factors partly as a direct and partly as an indirect contribution by the forest sector to economic growth.

The effects of backward, investment and consumption linkages were assessed in another study (Pellervo 1986) for twelve sectors of the Finnish economy in 1982 based on an input-output study. Among these sectors, the forest industries had the second largest linkage effects after food processing. For a long period forestry has contributed nearly half of the net farm capital income and, accordingly, it has been a key financer of agricultural investments. Thus a joint long-range expansion of forestry and agriculture has contributed favourably to economic development.

How Finland has been able to overcome the various theory reservations and development traps is also described. Particularly worth mentioning is the fact that a strong deforestation threat during the latter part of the last century was eliminated through an active forest policy and flexible operations of the market mechanisms. A further

beneficial factor was that cleared forests regenerated naturally without erosion and its serious consequences.

Accordingly, the hypothesis that the forest sector was the key factor in mobilizing and maintaining Finland's economic growth and other economic development since the middle of the last century could be sustained. In this respect Finland may hold a unique position in economic development among the nations of the world.

Analysis of the prospects for developing countries remained at a rather preliminary stage. Further case studies are required and, in fact, have been initiated (Chile) to complement the picture gained in this study. The development prospects of the Third World looked paradoxical: on the one hand the achievements in general economic development for a great number of countries seem promising, while on the other hand only a few countries were identified where forest-based economic development could be observed on a scale that might have had sustained net effects on the general economic development. Even in these cases there are considerable deforestation threats.

The revised theory of forest-based development served well its function to guide observation also in developing countries. The share of forest sector exports out of total exports was found, as a rule, to be too low for full mobilization of forest sector-led development according to the theoretical requirement and the case of Finland. The role of logs in relation to more processed products had also remained too strong in most of the Third World countries to facilitate a proper diversification of domestic forest industries. Foreign concessions of forests, capital and labor have also partly hampered proper development through the repatriation of incomes and foreign dependency.

The role of income and wealth distribution on development has been frequently emphasized. It was also a key element in the agricultural and consumption linkages of the revised theory. Apparently low wage levels and the predominantly public

ownership of forests have hampered the proper formation of these linkages. The lack of stumpage income for farmers has meant that one key form of financing agricultural development has been, according to the case of Finland, omitted.

Only a few areas in the developing world where a positive general economic development can be explained by forest-based economic development have been identified. Instead, the serious consequences of uncontrolled logging, followed by shifting cultivation, and of other uncontrolled use and clearance of forests frequently occur. Deforestation and the consequent erosion jointly initiate a form of antidevelopment process that is rarely touched on in the numerous publications on economic development.

In the second part of the present volume Jyrki Salmi introduces the means of land reform as a weapon to decelerate tropical deforestation.

In most developing countries economic development is difficult when landownership is highly skewed and there are 'elitistic' characteristics in the structure of economy. In this kind of situation, which is common in Latin America and Asia, land reforms and broader rural reforms are needed. However, the land reforms are politically difficult to execute. Those methods that leave the final decision to the individuals, e.g. tax-induced land reform, might be politically more acceptable than the coercive ones. The increase in agricultural productivity and the overall economic development, caused by the land reforms, could contribute to nature conservation and especially to the survival of tropical forests.

The "World Conference on Agrarian Reform and Rural Development" (WCARRD) of 1979 adopted a Declaration of Principles and a Programme of Action. However, the progress towards the objectives of the conference has been slow. Only few countries have introduced significant policy changes relating to land distribution. In most cultures, land is a symbol of permanent power and wealth. Thus, it is natural

that landowners insist on conserving the prevailing situation of land tenure. Every land reform program has been and will be attacked by the present land elite. Often the reforms fade out due to the lack of adequate institutions to implement them once legislated. An effective organization for the implementation and follow-up is necessary. Finland is described as a case of successful implementations of land reforms.

THE FOREST-BASED DEVELOPMENT THEORY REVISITED WITH A CASE STUDY OF FINLAND AND PROSPECTS FOR DEVELOPING COUNTRIES

by

Matti Palo

ABSTRACT

The theory of forest-based development, as formulated by J.C. Westoby in 1962, is revised and integrated into the staples and linkage theories. The effects of the forest sector on economic development in Finland are then described by applying this provisional comprehensive theory. During the past hundred years the exports of the Finnish forest sector correlated positively and strongly with economic growth. This simple statistical association is interpreted through a separate identification of the causal factors partly as a direct and partly as an indirect contribution by the forest sector to economic growth. Westoby stated correctly some key development factors but he clearly underestimated the role of the agricultural linkage of the forest sector, while neglecting the analysis of fuelwood and the key roles of income distribution and deforestation on economic development. Finally, the applicability of this approach to developing countries is tentatively discussed. A few developing countries, such as Malaysia, Indonesia, Swaziland, Chile and Brazil, have penetrated the international markets for processed forest products, but the majority of such countries have remained outside the potential benefits of export-led, forest-based development. The precise formulation and empirical testing of the theory of forest-based development, especially where it concerns the developing countries, remain outside the scope of this paper.

Keywords: forest-based development, economic development, forest sector, deforestation, Finland, developing countries.

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1. INTRODUCTION

1.1. Past forest policy

An interesting policy paper published by FAO (1958) already at the end of the 1950's widely discussed the potential deforestation effects of the likely expansion of forest industries to developing countries. The paper wished "to show that the most serious encroachments on the forest occurred long before the advent of modern forest industries". The paper also brought up the point that industrialists have acted as timber miners from time to time and particularly so in North America: "The story of forest exploitation by essentially timber mining methods in the United States is gloomy enough".

"The foregoing pages have stressed - some might say overstressed - the new spirit that is aboard today, and the reasons why one may hope that lessons have been learned from the errors of the past, and that the impact of the forest industries on the forests in the future is likely to be more beneficent than destructive" (FAO 1958, p. 33). It was clearly pointed out that the acceleration in economic growth is bringing with it a rapidly rising need for industrial wood also in the developing countries. However, the danger was observed that developing countries with ample timber resources may be tempted to offer concessions "on terms which are not consonant with good stewardship of the forests". However, it was believed that the rise in 'forest consciousness' and in "understanding the multiple role of the forest both by the government and by the man in the street in developing countries would prevent this kind of adverse practice". (FAO 1958, p. 75.)

Then came the 'classic' paper on "Forest industries in the attack on economic underdevelopment" by Westoby (1962) in collaboration with Isaac Kissin, Luigi Spaventa, and Alben Urbanouwsky, as well as the staff of the Forest Economics Branch of FAO (Westoby was the chief of the unit). It introduced the traditional theory of forest based development

in its early version. No explicit theory-concept was used, but it was clearly a theoretical breakthrough in comparison with the previous practice (e.g. FAO 1958), and especially so in pointing out the potential interindustry linkage effects of forest industries. The paper achieved a wide acceptance and has become one of the most frequently cited papers in contemporary forest economics.

Osara (1963), then the new Director of FAO's Forestry and Forest Products Division, brought up the comparative advantages developing countries might have in forest plantations serving large-scale pulp mills. He made investment calculations based on costs of both plantations and a mill, and derived a cost value for pulpwood produced in plantations. He concluded as follows: "Although there may be some questioning of the results of the above calculations, they do seem to show sufficiently convincing that (coniferous) pulpwood may be produced in tropical and semitropical zones at a cost which is only a fraction of the corresponding European price. If world wood, paper and board consumption does indeed grow at the rate expected, no other conclusion can be drawn but that the tropics are bound to play an ever-increasing role in the world's wood and fiber supply." (Osara 1963, p. 119.)

Leslie (later the chief of the Forest Industries Division of FAO; 1968, 1971) expressed his belief in the potential of tropical forestry for economic development. He left the question open as regards the extent to which this potential was realizable and how to make it a priority sector in economic planning for developing countries. Leslie maintained Westoby's (1962) approach, with forest industries having well developed external economies and foreign exchange earning and import replacement capacity. He also stressed that the impact will only develop through an integrated national forest industry complex. "The exploitation of tropical forest for export log market is likely to have a greater effect on development in the receiving country than in the exporting country. An export log trade may have short term advantages for a developing country, but the opportunity costs in terms

of long term multiplier and linkage effects could be far too high." (Leslie 1968, p. 51.)

Gregory (1971), in his textbook 'Forest Resource Economics', devoted one chapter to development questions under the title 'Forestry and International Affairs'. He gave an up-to-date summary both of Westobian theory of forest-based development and of general development economics. Gregory pointed out the possibility of 'unbalanced' growth according to Hirschman (1965), and the chance of having a forest sector that is such a leading sector that it is able to pull along via backward linkages or to push ahead via forward linkages other sectors of the economy concerned. He also identified potential problems facing forest-based development, such as information shortages, tree species heterogeneity, small local markets, transportation, and vague landtenure.

Grayson (1976) edited a collection of 14 articles on forestry-related development issues. The publication was a result of a IUFRO Working Party meeting. The Party had been established in 1970 by the 15th World Congress of IUFRO in Gainsville, Florida, to consider methods of evaluating the contribution of forestry to economic development. This activity reflects a growing concern on development issues by forest economists.

The establishment of pulp and paper mills among the various forest industries has appeared to be the most problematic in developing countries. Rather large economies of scale and capital requirements, and relatively high technological and marketing know-how skills are some of the factors contributing to this. FAO (1973) published a specific "Guide for planning pulp and paper enterprises" without explicit specification of these problems or the role of pulp and paper mills in economic development.

King (1977) concluded that many developing countries cannot afford, even through borrowing, the large amounts of capital needed for mills with capacities of 750 to 1000 tons a day as recommended. Such a size would result, in at least 33 % of

the cases examined by FAO, in one pulp and paper mill in a country making a contribution of at least 40 % to the respective GNP. Such a great reliance on one commodity is undesirable in most cases. King, the Assistant Director General in charge of forestry at FAO, recommended as FAO policy the establishment of small-to-medium-scale integrated pulp and paper mills designed to meet the domestic or regional markets of developing countries.

The Pulp and Paper Industries Development Program by FAO was executed in three phases during 1974 - 1980 (Svanqvist 1980). The program was designed to assist developing countries to expand existing pulp and paper mills or establish new ones where these appeared to be feasible and viable. The program characterized pulp and paper industry as having a low employment effect relative to investment, a low return on investment, and strong linkage and multiplier effects with an otherwise average profile.

Ultimately FAO (1983a) produced a specific guide for developing countries for establishing pulp and paper mills. Appropriate pulp and paper technology, use of second-hand paper machines, aspects of protecting pulp and paper industries, and social integration of pulp and paper industries were some of the topics reviewed. "The establishment of pulp and paper industries in developing countries is based on two basic types of objectives- positive ones and defensive ones. The positive objectives relate to creation of employment, development of skills, rural stability and foreign exchange earnings. The defensive objectives, on the other hand, aim at safeguarding the domestic resources to reduce imports wherever possible. Thus the available foreign exchange can be set aside for raw materials and products which cannot be produced in the country, for instance for fuel oil." (FAO 1983a, p. 82).

Environmental modifications

Zivnuska (1966) brought up a 'natural' sequence in the establishment of forest industries in developing countries:

first sawmills, then panel-producing mills and later on pulp and paper mills. This order would ease the financing of investments where an outlet could also be found in neglecting sustained yield forestry. This was a contrasting view to the prevailing primary FAO policy (FAO 1958; Westoby 1962).

Sartorius and Henle (1968) stressed the many problems encountered along forestry's road to foster economic development. They discussed widely expanding tropical deforestation problems and advocated a sustained yield forestry, as was clearly pointed out also previously by official FAO policy papers (FAO 1958; Westoby 1962). Sartorius and Henle also brought up the key function of forestry administration in economic development, much in line with Reynolds (1985) above (section 41). They suspected the capabilities of forestry administration in developing countries.

Nautical and Smith (1968) supported Zivnuska's (1966) view that sustained yield forestry was not universally desirable for developing countries. They recommended an economic goal for forestry, such as maximization of the present worth of net benefits from forest land. Accordingly, sustained yield would be the best solution only under rather rare circumstances. The only potential threat for excessive deforestation they considered to be a 'timber famine', which they proved, was inconsistent according to economic theories. They did not realize the basic ecological differences between temperate and tropical forests: the consequences of large-scale deforestation with consequent erosion can often be catastrophical in the tropics.

The United Nations' Conference on the Environment in 1972 in Stockholm was a turning point in international policy formulation in this field. The United Nations' Environmental Program (UNEP) became soon established. Unesco launched its global research program on 'Man and Biosphere'. FAO produced a couple of interim studies on tropical deforestation and finally, jointly with UNEP, an integrated assessment of forest resources and deforestation in 76 tropical countries

(Lanly 1982). Unesco, UNEP and FAO (1978) published jointly a massive handbook on "Tropical forest ecosystems. A state of knowledge report." This document gave an in-depth description of the complicated and fragile nature of tropical forest ecosystems. It also gave an identity to 200-300 million 'forest people' living in and around the forests, and obtaining their subsistence out of them mainly through shifting cultivation, hunting and gathering. The erosion sensitivity, gloomy consequences of erosion and the vulnerability of forest people to deforestation was vividly illustrated.

However, the management of natural, mixed, moist tropical forest according to proper silvicultural and economic regimes remained to a great degree open, especially so as regards the question of sustained yield and natural regeneration. It was argued that sustained yield management locks up large areas of land and large blocks of realizable capital. They were hence two scarce commodities in most developing countries, sustained yield management and low-yielding natural forest being almost indefensible. The replacement of natural forests by plantations was widely recommended.

Leslie (1977) concluded that "in terms of discounted cash flow analysis of the value of wood produced, the economic outlook for natural management of moist tropical forest is not bright". Therefore, in Leslie's opinion the maintenance of natural, moist tropical forest would rest principally on the threats of their eventual disappearance. Later on, Leslie (1987) came to another view "natural management of the tropical mixed forest is likely to be a better economic and financial proposition than alternative land uses or management systems". This view was based mainly on the non-priced values of natural forest's externalities.

Von Maydell (1975) referred to Westoby's (1962) outline for future manufacturing investments in the tropics but noticed that, despite some progress, it took until the early 1970's before the majority of tropical roundwood exporting countries

started to set restrictions on such exports in order to better supply their own forest industries or to induce new industrial investments. Von Maydell gave examples of objectives for tropical moist forest countries: environment, energy, food, building materials, pulp and paper, infrastructure, reduction of waste in logging and processing, as well as machinery and services. He pointed out that within the tropical, moist forest zone the vulnerability of forest lands - and thus of life - to different forms of human intervention is high and often irreversible. Thus, he argued, saving and improving forest ecosystems should rank first among forest-based investment opportunities.

The policies of international bankers

The international banks and national donor agencies initiated their activities in the forest sectors of developing countries during the 1950's. Their investment financing increased first rather slowly, but became a more standard practice during the 1970's. Therefore it also became common for international bankers to express policy lines of future priority.

A prelude in this front was "Forestry in developing countries. Potentials, constraints, and opportunities" by the Agency for International Development of the United States (USAID 1972). The report identified the following timber advantages of developing countries: fast growth of planted trees, further expansion of domestic supplies in the developed world will be slower and more costly, a new innovation allowing the utilization of mixed tropical hardwoods for pulp and paper, subsequent lower costs in logging, low costs and abundant forest resources and labor supply. The major thrust of the paper was that both timber utilization and institutional development must proceed together. It was also emphasized that "the perspective of history is likely to judge the environmental forestry benefits to have been of greater importance than the economic aspects" (USAID 1972, p. 64).

A pioneering new approach was brought the activities of international agencies in 1973 by MacNamara, then the President of the World Bank, in his book "One hundred countries, two billion people". The lot of the subsistence farmer was brought up as follows (cited from Westoby 1978):
... "For hundreds of millions of these subsistence farmers, life is neither satisfying nor decent. Hunger and malnutrition menace their futures. Disease and death visit their villages too often, stay too long, and return too soon."
"The miracle of the Green Revolution may have arrived, but, for the most part, the poor farmer has not been able to participate in it. He simply cannot afford to pay for the irrigation, the pesticide, the fertilizer, or perhaps for the land itself, on which his title may be vulnerable and his tenancy uncertain."

The World Bank (1978) introduced its new policy by stressing environmental and rural development aspects. It was argued that the consequences of continued uncontrolled forest exploitation are of critical concern to mankind, for they could lead to serious environmental disruption and increased rural poverty. Due consideration had to be give also to fuelwood, since over 90 % of wood consumption in developing countries is accounted for by fuelwood. Only fragments of Westoby's (1962) view on the development potentials of forest industries remained in the report (World Bank 1978, p. 29). The priority on directions for the future was as follows: environment, rural development, industrial forestry, and institutions.

The regional international banks followed The World Bank in their own policy formulations. The Asian Development Bank (ADB 1978) listed a number of potential benefits of forest industries in development, typically according to Westoby (1962), but realized that despite these features "the forestry sector in the region has not so far made a commensurate contribution to development; the reasons relate to the extent of unprocessed exports, anomalous pricing policies, resistance to change and trade malpractices" (p.

6). Despite the problems, opportunities were identified under such headings as: (i) forest industries, (ii) industrial plantations, (iii) agriculture supportive forestry, (iv) environmental forestry, and (v) reclamation forestry.

The Inter-American Development Bank (IDB 1982) followed suit by first noting that the great abundance of forest resources in Latin America indicates a largely untapped source of wealth for most countries of the region. The report argued that forestry development is basic to the evolution of privately-owned forest industries, but also a valuable public resource which must be conserved and protected. Furthermore, forestry was characterized as symbiotic to agriculture. The priority opportunity areas for future investments matched rather well those the of Asian Development Bank (above) with the exception that institutional development was also included.

The Inter-American Development Bank subsequently launched an analysis of investment opportunities and financing needs under the title "Forest-based development in Latin America" (McGaughey and Gregersen 1983). It was first observed that forestry and forest-based activities have been neglected in the development plans and programs of many Latin American countries. The following three goals were set: Improve the energy supply and remove energy bottlenecks; Improve agricultural productivity and production; Expand efficient industry to provide employment opportunities, income growth and goods and services. Forest investment strategies were then derived including (1) forest industries and industrial forest plantations, and (2) social and protection forestry. The estimated annual investment requirements for item (1) ranged from USD 6.6 to 9.2 billion during 1981-2000, and item (2) from 0.1 to 0.2 respectively. Particular attention was paid to institutional requirements for expanding forest sector investments.

12. The problem

A number of descriptions exist, written by economists, forest economists and economic historians, of the long-term events and development of forestry and forest industries in Finland, (e.g. Renvall 1910; Hanho 1915, Helander 1949, Halme 1955, Kunnas 1973, Kuusela 1974, Hoffman 1980, Ahveninen 1984). On the other hand, the effects of the whole forest-based sector on economic development in Finland have been examined only rarely (e.g. Raumolin 1984). For example, little mention has been made of this aspect of development in a series of studies on economic growth carried out by the Bank of Finland. The academic tradition in Finland has neglected research on the historical roots of our wealth. This is surprising considering that hardly any other country in the world has, for such a long period, been so strongly dependent on the forest sector and its economic development effects as Finland (Figure 1.1).

Considerable time elapsed following Saari's (1928) and Osara's (1950, 1958) early contributions towards understanding the role of the forest sector in the national economy as a whole before interest was again shown in this field in Finland by forest economists (Jha 1973, Seppälä, H. 1976, Riihinen 1981, Koljonen 1983). Hoffman (1980), in his doctoral dissertation, questioned the applicability of the staples theory to the development of the Finnish sawmilling industry. However, his time-series (1860-1900) were too short, and sawmilling as such too narrow a sector, to permit elucidation of the development potential of the forest sector.

Increasing international interest has been shown in the problem of forest-based development since the 1960's, especially in focusing on the developing countries. Westoby's (1962) hypothesis of the above average strength of linkages from forest industries was an inductive inference from input-output tables of four industrialized countries. Westoby's outlines for a development theory of a forest sector were optimistic hypotheses of a forest sector's effects on

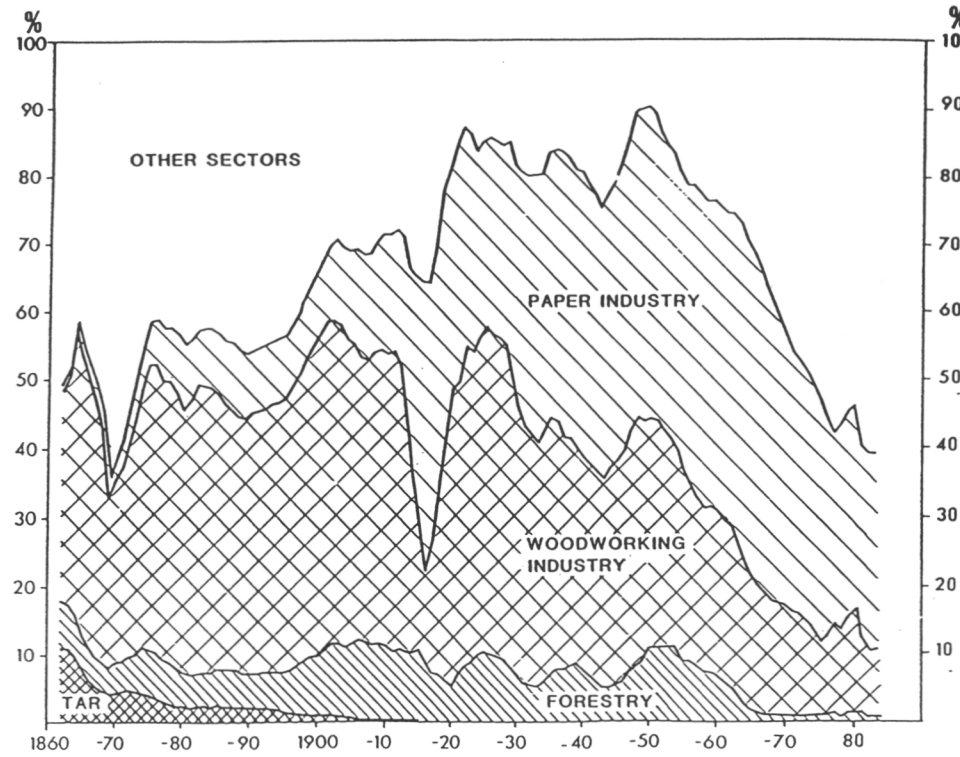


Figure 1.1 The shares of total exports by industries in Finland, 1860 - 1983 (five year moving averages; sources Seppälä et al. 1980; Finnish Board of Customs).

economic development in developing countries (Westoby 1962, 1969). During the 1960's, Westoby did not present any critical reservations on the applicability of his theory and it was not empirically tested. The rather negative experiences of development agencies, combined with critical discussion of the possibilities of realizing the potential development effects, promised for developing countries by his theory, ultimately gave rise to pessimism (Westoby 1978).

Only a few countries or districts in the Third World have been identified where a positive, general economic development can be explained by forest-based development

(e.g. Westoby 1978; Leslie 1980). Instead, deforestation and the consequent erosion jointly initiate a kind of antidevelopment process (Palo 1987). The purpose of the present research project (Palo & Salmi 1987) is to analyze both deforestation and development simultaneously. The findings of the World Commission on Environment and Development (1987) support such an approach. This paper, however, is primarily concerned with forest-based development.

In developing countries deforestation and erosion, together with their causes and effects, form a vicious, often accelerating circle that accentuates rural and urban depression. Decelerating or halting such trends appears to be highly problematic. The problem of deforestation is politically hard to solve owing to its paradoxical nature: its driving forces lie both in affluence and in poverty. Industrial logging often works as an indirect factor: by constructing new roads and extracting the largest trees it opens up new, previously inaccessible forests to the more direct agents of poverty which, in turn, further increase the clearing of forest (Palo & Salmi 1987).

The export value of forest products, based on the industrial logging of natural and plantation forests, in all the developing countries amounted to USD 7-9 billion annually in 1980-1984 (FAO 1986b). The large-scale nature of this business makes it even more difficult to control industrial logging operations.

Some symptomatic problems in forest-based development are inherent in deforestation: decreasing future supplies of roundwood and fuelwood, and of export trade in forest products. The share of the export value of the developing countries out of the world total has declined from 18 % to 15 %, while the equivalent share of the import value has grown from 12 % to 19 % during 1973-1984 (FAO 1986b). Accordingly, even the self-sufficiency of the developing countries has been declining. However, the value of the forest-product exports of the developing countries has doubled between 1973

and 1984, while that of the developed countries has grown by a factor of 2,4. A few developing countries, such as Malaysia, Indonesia and Brazil, have penetrated the international markets for processed forest products, but the majority of such countries have remained outside the potential benefits of export-led, forest-based development.

Later contributions in the field of forest-based development (e.g. Hughes 1970, Leslie 1971, Kromm 1972, Lid 1973, Douglas 1983, Raumolin 1984, Raumolin & Seppälä 1985, Pellervo 1986) have each taken a somewhat restricted approach, either in relation to the theoretical or to the empirical coverage. An attempt in this paper has been made to create an integrated framework and to cover the entire forest sector. However, the framework, as presented in this paper, will have to be further specified and its empirical testing continued. The applicability of the framework under developing country conditions can only be tentatively analysed in this paper.

13. The purpose

The research project as a whole should contribute towards increasing our knowledge concerning the forest-based economic development process in general, and about its deforestation constraint in particular. More specifically, the purpose is to enhance the chances of ex ante and ex post evaluation of forest-based development projects in developing countries and of strategy choices. A concomitant aim is to contribute towards increased education and training by facilitating the completion of several theses for graduate and under-graduate students in the case study countries, as well as in Finland, and also by organizing specific training courses. A final aim is to interact with diverse national and international policy-makers and agents of deforestation and development, and to disseminate effectively the research results in order to improve the relevant control mechanisms.

Public administration, education and research of forestry and of forest industries have been traditionally separated from

each other in Finland and in most other countries. However, forestry and the forest industries form, together with the linkages between them and the utilization of the goods and services they produce, a functional whole. This whole is called the forest sector in this paper. The functional relationships between the components of the forest sector have strengthened during the last hundred years. A domain corresponding to the forest sector has traditionally been applied in the Forestry Department of the United Nations' Food and Agriculture Organization, FAO (e.g. Westoby 1962) and in recent forest economics research in Finland (Pöyry 1979; Seppälä et al. 1980) and abroad (e.g. Kallio et al. 1987).

In general economics and in economic history, however, entities such as the forest sector have only seldom been used as units of description and analysis in Finland (e.g. Pipping & Bärlund 1968). Raumolin (1984) has outlined a concept of a "forest industry complex" with somewhat broader contents. The sector division established in the system of national income accounting (SNA) describes the national economy as primary production, processing and services, and their subordinate groups. In a division of this sort, as well as in analyses based on such a division, functional entities like the forest sector are cut into pieces. "Forest-based" is applied as a synonym for "forest sector-based" in the following.

Economic development has traditionally been interpreted to mean economic growth, and was used to refer to a steady increase in real GNP per capita during a particular period of time. Economic development has traditionally also been typically seen in terms of planned structural change: agriculture's share declines, whereas that of manufacturing and service industries increases. Problems of poverty, unemployment and distribution were often considered to be of secondary importance to "getting the growth job done" (e.g. Todaro 1977).

The experiences of Third World nations during the 1950's and 1960's were, however, particularly disappointing. A high number of them did achieve the overall UN growth targets, but the levels of living of the masses remained rather unchanged. The results were interpreted as indicating that something was very wrong with this narrow definition of development. Accordingly, economic development became redefined in terms of the reduction or elimination of poverty, inequality and unemployment within the context of a growing economy (e.g. Todaro 1977).

A new concept of 'level of living' was launched in the 1950's and 1960's by a United Nations' committee of experts (United Nations 1961). Level of living was assumed to be composed of nine 'components' which were thought to be empirically measurable through 'indicators'. The suggested nine components for level of living were as follows: health, nutrition and other private consumption, housing, culture, employment and conditions of work, clothing, social security, recreation and entertainment as well as human rights (Waris 1968).

Environmental quality has recently been taken as a further extension to the concept of economic development. It has been strongly recommended by The World Commission on Environment and Development (1987) and by other international bodies. In this paper the concept of 'economic development' is broader than economic growth. Economic development comprises, in addition to the real growth of production per capita, changes in the following components: distribution of income and wealth, working conditions, environmental quality and other components of the level of living, institutions and economic and political power. The development brought about during the course of history cannot be readily analyzed in this broad sense, but the aim of this paper is to identify the effects of the forest sector on a few of the most essential components.

This paper presents a provisional, theoretical framework for forest-based development analysis. An integrated theory of forest-based development will first be reviewed and outlined. The general development and effects of the forest sector in Finland are then briefly described by applying this provisional theory. Finally, the applicability of this approach to developing countries is tentatively discussed. The precise formulation and empirical testing of the theory of forest-based development, especially where it concerns the developing countries, remain outside the scope of this paper.

The paper was prepared during the pilot study on deforestation and development, the aim of being to identify the relevant criteria of forest sector development among developing countries concomitantly with deforestation analysis. However, the paper remained in a preliminary phase. As such, it may serve its role in encouraging critical discussion on this crucial field.

The results anticipated from this research project will contribute to our knowledge, leading to more effective controls designed to check avoidable deforestation and its serious consequences. The results may also assist in the allocation of development aid and business investments within forest sectors of developing countries more effectively from the economic development point of view. The results will be transmitted to the relevant national organizations, international agencies and firms which require quantified data for their project evaluation and decision making.

Consequently, the potential beneficiaries of the present research project include developing countries, national development agencies, forest industry firms and other relevant national and international bodies. Special emphasis is devoted to the applicability of the study in promoting development and putting brake on deforestation in the developing world.

2. FOREST-BASED DEVELOPMENT THEORY REVISITED

21. Selected, integrated approach

A great number of theories and approaches have emerged within the broad field of development economics and of economic development (e.g. Bablewski 1982, Kiljunen 1985, IEA 1986, Hetemäki 1986; Lewis & Kallab 1986). Among them the staple theory examines the development problems of, national economies based on exports of strongly natural resource-based goods (staple goods) in "new countries". The Canadian researchers H.A. Innis (1956) and W.A. Mackintosh (1939) are considered to be the pioneers of the staple theory. They analyzed the long-range development problems of the Canadian economy from the point of view of the development of exports in such staple goods as fish, fur, wheat and sawnwood.

Following the creation of the input-output model, the staple theory has been formalized through a so-called linkage analysis (Hirschman 1958). Linkage analysis has been applied to development analysis of the Canadian economy, as well as to the analysis of the economic development of developing countries which are dependent on exports of staple products (e.g. Hirschman 1958, 1977; Thoburn 1977; Watkins 1963, 1977).

The theoreticians from USA articulated the staple theory further and, in the 1960's, Canadian researchers again started to discuss the staple theory. In the 1970's there were three different schools of thought concerning the staple theory: 1) researchers integrating the staple theory to the neo-classical theory of export-led growth; 2) researchers integrating the staple theory to the structural theories of economic development, and 3) researchers integrating the staple theory to neo-Marxist theories. (Raumolin 1984.)

Since the 1950's some development and forest economists have analyzed the effects of the forest sector on development from the point of view of staple theory and/or with linkage analysis. This discussion has taken place at the

international level, but not until recently in Finland or in the other Scandinavian countries (e.g. Cohn Jr. 1954; Westoby 1962, 1969; Zivnuska 1966; Sartorius & Henle 1968, Nautical & Smith 1968, Nadeau 1981). In Sweden, Algvere (1969) stressed the importance of "development economics of forestry" as a new discipline, but his approach was based on other grounds.

A specific theory of forest-based development is first outlined in this chapter on the basis of a structural interpretation of staple theory and linkage analysis. This is then integrated with some extensions of the traditional theory of forest sector development created primarily by Westoby (1962, 1969). Specific attention is paid to the various reservations inherent in the integrated theory.

22. Linkage mechanisms

The most fundamental assumption of the staple theory is that staple exports are the leading sector of the economy, and hence set the pace for economic growth. The favorable factor proportions - an abundance of land relative to labour and capital - and the limited domestic market create a comparative advantage in exporting staples or natural resource-intensive goods. This export activity will lead towards economic development through expansion of the staple sector and a process of diversification. The spread effects of the export sector or the impact of such exports on the domestic economy and society thus become the central theme of the staple theory. These spread effects are classified and described in this section. Identification of the specific characteristics of a forest sector, and the potential goods it can produce, is done later on (in section 24). The latter aspect refers to one distinguished feature of Innis's (1956) original work: staple goods like wood, minerals, grain and oil have diverging inherent development potentials.

In countries which are economically developed and politically powerful (metropoles), the import demand for staple goods

increases along with rises in the population and per capita income. Countries of the periphery supply the staple goods. Such countries comprise economically and politically underdeveloped countries which are rich in natural resources and where the various production factors create comparative advantages for exporting such goods. An absence of inhibiting traditions is also assumed.

The expanding export prospects for staple goods create five different types of investment opportunities in countries of the periphery: investments inside the staple branches, backward and forward linkages external to these branches, as well as investment and consumption linkages external to the branches. If the export sector for staple goods of a country lying on the periphery has multitudinous and strong domestic linkages (ceteris paribus), it will promote the economic development of this country more than another sector with one-sided and weak linkages (Fig. 2.1).

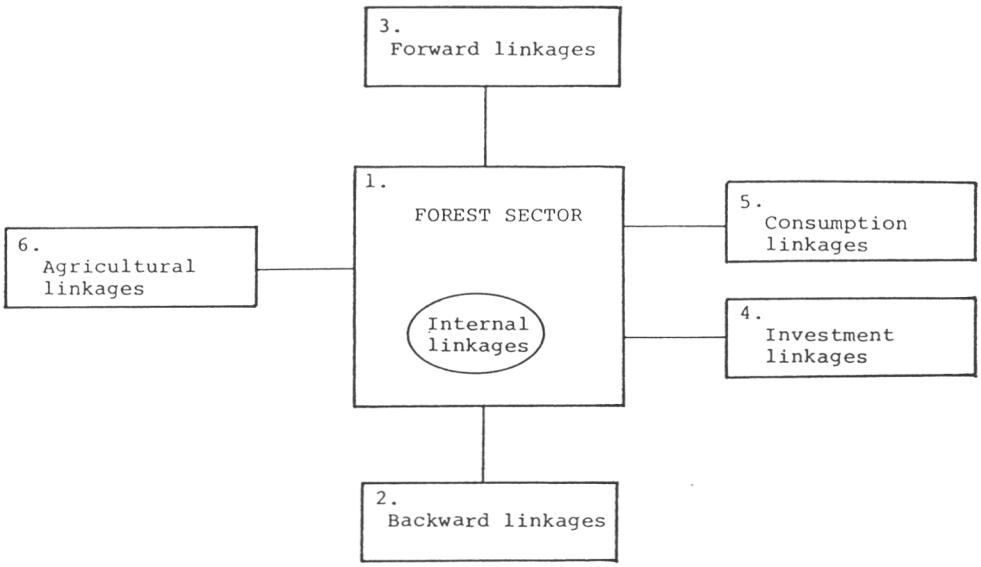
The backward linkages of a staple sector create direct production and investment opportunities in other domestic sectors whose output can be used as input in the regular production of the staple sector. On the other hand, the forward linkages of a staple sector create direct production and investment opportunities in other sectors, as long as the output of a staple sector is the input of these other domestic sectors in their regular production.

When the increasing demand for products of a staple sector encourages entrepreneurs to make internal investments within the same sector, investment demand will be created for capital goods, such as the metal and machine goods and construction (opportunities for investment linkages). On the other hand, the domestic factor income from a staple sector will create linkage opportunities via consumption demand, if domestic entrepreneurs will mobilize their domestic investments in order to produce consumer commodities for domestic markets. The prime determinant of these linkages is the size of the domestic market: e.g. the consumption linkage

will tend to be higher, the higher the average level of income and the more equal its distribution.

Consumption and investment linkages are collectively called the linkages of final product demand. Backward and forward linkages refer to linkages of intermediate product demand. All these linkages form a network that combines various sectors in the national economy, and along which boom and contraction effects spread from one sector to another (Fig. 2.1).

The backward linkage of a staple sector that facilitates the product demand from another sector must often have a minimum scale before investments in this domestically new activity can be profitable. The expansion of staple goods production from small domestic markets to exports facilitates a minimum domestic demand for a new industrial activity. The respective inference also concerns the other potential linkages.



Clasification:

2 & 3 = intermediate product linkages
4 & 5 = end product linkages
6 = factor linkages

Figure 2.1 Frame model of internal and external linkages in forest sector.

A new domestic production based on exports and imports is more insecure and requires more know-how and experience than an activity based solely on domestic markets. Accordingly, domestic entrepreneurs are inclined to invest in a production with linkages to domestic staple sectors in order to avoid the hazard of starting a new production activity based primarily on product exports or input imports.

The formation and functioning of the linkage mechanisms are promoted by the existence of interindustrial external economies. The investment opportunities and subsequent investments are classified as autonomous and induced ones. The former are created by new technology or innovations, and the latter are induced by autonomous investments. Staple sector investments are regarded as autonomous from the domestic point of view, whereas linkage investments as induced. The input-output model measures backward linkages as indirect effects and final demand linkages as derived effects (through an inverse matrix). The size of forward linkages can be separately computed from an input-output model, although they have been only rarely computed. (E.g. Hirschman 1965; Pellervo 1986.)

Linkage refers here to an investment opportunity, the realization of which depends also on the emergence of entrepreneunship and other favourable factors. The outcome in a reasonable time shows the total linkage effect, which relies on the interplay of feasible additional industrial outputs and on the probability that each one of these industries will actually be set up. In this respect common knowledge suggests that backward linkages are more liable for realization than the others. In the first case the future demand for new products is secured, but the supply of inputs has to be studied separately. In the case of forward linkages the situation is vice versa. However, the Finnish forest industries investments, for instance, have been effectively induced by the forward linkages of domestic forestry.

In peripheral countries savings usually remain at a relatively low level due to the lack of profitable investment opportunities. In this situation the expanding staple sector may increase the rate of savings in the national economy of a particular income level through creating profitable investment opportunities. If the rate of savings remains constant while income from the export of staple goods increases, then the amount of savings will also increase. Consequently, the expanding exports of staple goods may, in addition to creating investment opportunities, increase savings and thus facilitate the financing of investments. Some staple goods may also have a quality of so-called autonomous financing, an example of which will later be described in connection with the theory of forest-based development.

The expanding exports of staple goods introduce new technologies in a country of the periphery when the investment opportunities created by it are realized. If an export staple good or its linkage good have not earlier been produced in a peripheral country, the new technology for producing such goods is needed. Furthermore, expanding production makes the introduction of new technology possible even if the product had earlier been manufactured in a peripheral country. New technology supports the economic growth if the partial productivities of the production factors it uses are higher than in alternative old domestic technology. New technology should, however, be socially acceptable and appropriate to the circumstances.

The investment opportunities created by the linkage mechanisms will not be induced solely by demand factors. The necessary complementary factor is entrepreneurship, the ability to perceive and exploit market opportunities. An adequate supply of domestic entrepreneurship is crucial for successful linkages. However, foreign domination may militate against its general diffusion.

A leading export activity in staple goods is assumed, according to the theory, to have, besides an effect on

economic growth, effects on income distribution and institutional, political and other social effects. These effects may vary according to differences in the characteristics of staple goods and ownership patterns in their production.

Large-scale and long-term exports from a peripheral country start and encourage the economic development of that country when the above described production and investment possibilities are realized. However, the character, extent and effects of development depend on certain circumstances in the peripheral country and on the prevailing international economy. The most important of these circumstances are next introduced (section 23) as reservations on the linkage mechanisms of this section.

23. Reservations on the linkage mechanisms

The potential economic development effects of the export sector of staple and linkage theory goods were described above. The realization of these positive effects in practice may, however, be hindered by certain unfavorable circumstances which are here regarded as reservations on the linkage mechanisms.

The export effects of staple goods on economic development are the less, the more staple activity and its linkages (factors) are owned and controlled by expatriates. This is reflected, for example, in development problems caused by technological dependence. Foreign ownership causes the expansion of development effects from a peripheral country to other countries. An illustrative comparative case is provided here by Finland and the province of Quebec in Canada (Raumolin & Seppälä 1985), where domestic and foreign ownership have dominated respectively.

The economic development of a peripheral country whose exports are based on staple goods is most sensitive to business cycles which result in unstable development. An

economy dominated by narrow staple activity may find it difficult to diversify its business activity and thus increase the stability of its economic development. A resource hinterland may, in such a case, fall into a primary staple trap dominated by the strong business cycles of the staple sector, and the whole national economy into a secondary staple trap (Watkins 1963; Raumolin 1982). When caught in a staple trap it is impossible to realize the investment opportunities created by the linkages of staple activity, or simply there are not enough of such opportunities.

Social institutions and values may emerge which are inimical to sustained economic growth, and the process of diversification through linkages will be difficult. Furthermore, those staple exporters with adequate political control may develop an inhibiting "export mentality", resulting in an overconcentration of resources in the export sector and a reluctance to promote diversification. The organizations involved in export trade have a tendency to be concentrated in a few centers only, inside the "export economy". A population problem may also be encountered, persistent unemployment and underemployment becoming characteristic of the economy. Effective macroeconomic planning and policy implementation can help to avoid staple traps.

The staple theory was originally created for new countries or countries of "recent settlement". This implies a favorable relationship between land and capital and labour if comparative advantages are to be created in staple exports. An underdeveloped country with population pressure on scarce natural resources clearly falls outside the scope of the theory. The location and the international environment can also vary as regards their suitability for realizing the linkage mechanisms.

An equal income distribution and a low marginal propensity to import are important factors in avoiding a staple trap in a staple economy. The more equal the income distribution, the

easier it is to realize the linkages of consumption demand. Increasing imports and foreign ownership of capital and other production factors allow an excessive outflow of export income abroad and may consequently hinder domestic investments.

In a national economy based on staple goods there may arise a tendency to exploit natural resources destructively (e.g. Palo 1984, 1987), instead of using them according to ecologically and economically sound, sustained yield principles. The lack of relevant research and monitoring activities, and inadequate political control of the usage of natural resources, are the two most obvious factors behind this threat.

The educational and scientific system of a peripheral staple producer often depends on the respective traditions of the metropolis, thus making it difficult to create an autonomous scientific capacity.

The realization of the linkage mechanisms will promote economic development through a multitudinous process of diversification centered around an export sector. The process is time consuming (several decades) and thus vulnerable to various reservations and risks. Hence effective economic planning and policy, and/or good luck are obligatory ingredients for the successful realization of the whole process. Furthermore, a forest sector for instance, has to be reviewed as a whole (section 12), since a partial review (e.g. only sawmilling) would neglect a substantial share of the diversification.

The staple theory emphasizes the significance of the properties of a staple good itself, and the special characteristics of its production functions for economic development. Consequently, in the following the linkage mechanisms are complemented with extensions to the traditional theory of forest-based development.

24. Forest sector characteristics

Forest products as staple goods

The abundance of natural resources is not a necessary prerequisite for successful economic development in a country. However, a great number of cases have shown that such resources can also play a key role in this process. (E.g. Kindleberger & Herric 1977; Myint 1980; Reynolds 1985.) While the structuralist approach has stressed the structure of an economy in general and of manufacturing in particular, the staple theory has stressed the role of diverging characteristics and production functions of different staple goods. Oil and various minerals are characterized by linkage mechanisms that only seldom lead to diversified, stable economic development. Large-scale plantation crops have also tended to form closed foreign enclaves instead of leading to general development. Thus the form of resource ownership and consequent distributional effects also apparently play a role. (Baldwin 1956, 1963; Watkins 1963; Hirschman 1977.)

The traditional theory of forest-based development was introduced by Westoby (1962, 1969). In the present paper his ideas are complemented with additional references and inferences. The traditional theory contained the idea of linkage mechanisms, which was modern development economics of that time, but no connection to the staple theory appeared. Also the way in which the linkage mechanisms were supposed to function, remained rather open. "The role of forest industries in the attack on economic underdevelopment" (Westoby 1962) was addressed to the policy-planners and policy-makers of the Third World, but its theoretical framework rested on the experiences of the industrialized countries. Some reservations, repercussions and peculiarities, symptomatic in this respect to developing countries, will be introduced later on (chapter 4).

Established settlement, population increase and economic growth tend to decrease the forest resources of metropolitan countries. A peripheral country with a low population

pressure may have rich forest resources and a favourable location, which contribute to her comparative advantages specifically in the export of forest sector goods. The income elasticity of demand for many staple goods is declining at higher income levels, particularly in the case of most primary food products subject to Engel's law.

The income elasticity of demand for most forest industry products is, especially at low income levels, relatively high, which means that the demand for these products strongly increases in countries characterized by fast economic growth (Westoby 1962). This was particularly the case with pulp and paper products which had elasticities ranging from somewhat below unity (USA) to 2.5 - 3.0 in the lowest income countries. The income elasticities of sawn-wood and panel products were considered to be more uncertain, but their demand also seemed to increase with income, and, at low levels of income, at a rate equal or greater than the rate of increase in income. The income elasticities have since declined somewhat but a recent study by FAO (1986a, p. 95) maintains that consumption is growing along with income. The estimated income elasticities for various product groups and income classes were as follows: newsprint 0.4 - 0.8, printing and writing paper 0.2 - 0.9, other paper and paperboard 0.8-1.4, wood-based panels 0.5 - 1.2 and sawnwood 0.1 - 0.9.

The previous assumptions concerning demand and supply aspects will lead to large-scale exports of forest sector products from a peripheric country under certain additional conditions. The favourable economic-geographical location of a peripheral country, a supply potential of entrepreneurs, know-how in appropriate technology and an adequate supply of labour, energy, capital and infrastructure are some of the other supply conditions needed in realizing export opportunities. According to the staple and linkage theory, increasing exports induce production and investment opportunities, through linkages, both inside the forest sector and also in other sectors.

Wood as a versatile material

Westoby (1962), in his 'classical' paper, restricted his presentation on industrial roundwood. His view then was that fuelwood was secondary in relation to development, "but by no means negligible". Neither did he point out the specific character of the floatability of roundwood. Both aspects are here regarded as being highly essential, specifically in relation to early forest sector development.

Wood differs as a material from ores and most agricultural products in the respect that wood can be used both as an industrial raw material and as a source of energy. Wood in different forms, such as firewood, fuel chips, charcoal, waste liquor of the pulp industry or in other forms of liquid or gaseous fuel, is under certain conditions and at normal times a profitable fuel, while during times of crisis it is a reserve fuel in forested countries.

Wood as a material differs from other staple goods also regarding its floatability. The specific gravity of most kinds of wood is lower than that of water which enables floating under appropriate watercourse conditions. The processing qualities of floated wood generally remain the same or may even improve. Storing roundwood under water reduces the risk of rot. Floating saves energy and, in the case of large water systems, makes wood harvesting feasible without any general man-made infrastructure. (Saari 1928.)

Forestry and forest industries satisfy many of the basic human needs: in housing (sawnwood, wooden panels, firewood etc.), culture (newsprint, printing and writing paper, forest landscapes, conservation of forest ecosystems and species etc.), health (medicines, household papers, wrapping paper, recreational areas, soaps etc.), food (forest fruits, nuts, berries, mushrooms, game, cattle fodder, a specific product from pulp waste liquor/Pekilo etc.) and clothing (e.g. rayon fabric). Production lines in the forest sector geared to satisfying these needs can generally be implemented in a

flexible fashion with respect to scale and transferability of their varying inputs and technology.

The choice of each alternative can be made according to the particular economic development phase and other specific circumstances prevailing in the peripheral country. Only a few other business activities permit such an elastic choice of production alternatives (Westoby 1962). Accordingly, forestry provides flexible alternatives for forward linkages. On the other hand, backward linkages of forestry, as of all other primary production sectors, are comparatively low since most of the inputs are natural (Hirschman 1958).

The economic duration of forest products generally extends over long periods (Kauman 1987; Ebeling 1987). Until recently, it has also been possible to apply relatively simple technology, especially in the mechanical forest industries. Because technological change is slow compared with most other sectors, it would appear possible to create an autonomous and internationally competitive scientific and technological capability for the forest sector in peripheral countries (e.g. Raumolin 1982, 1984).

External economies

Westoby (1962, p. 4-5) advocated forest industries with their own ability to create value added and employment, as well as their positive and strong external economies. In the former respect the forest industries ranked fifth among industries of the world in terms of value added, and fourth in terms of employment. The latter feature was studied by him on the basis of Chenery's and Clark's input-output tables concerning Japan, Italy, the United States and Norway (ibid.). It appeared that, on the average, the woodworking and paper industries have stronger forward and backward linkages (Fig. 2.1) than other industrial sectors. Therefore, during the long period when the investment opportunities created by linkages are implemented, ceteris paribus, establishing and expanding the forest industries are assosiated with stronger

economic development effects than, on the average, in other industrial sectors. (Ibid.)

Westoby's previous findings were supported by Hirschman (1965) who reproduced Cherery's and Watanabe's input-output results concerning Japan, Italy and the United States. By ranking industries according to their combined average score of backward and forward linkages the following results were produced: the paper industry was third, woodworking twelfth and forestry (with agriculture) twenty-third out of a total of 29 industrial sectors.

Forestry and autonomous financing

Wood from natural forests, when used as a raw material for forest industries and as an energy source, and water, when used for processes, energy production and transport (floating etc.), do not require any particular production expenditures. Favorable terrain and climate, watercourses and a cheap labour force make it possible to furnish mills with roundwood at a low level of expenditure. Under such conditions natural resources that were earlier economically inaccessible can be transformed into real capital. This fact partly facilitates the financing of investments in the pioneering forest industries. This characteristic of the forest sector can be called an autonomous financing property (Osara 1958; Westoby 1962; Zivnuska 1966).

The autonomous financing character of natural forest was especially utilized in the past in those countries that are nowadays industrialized. Leslie (1968, p. 41-42) describes this process as follows: "For instance, in many of the countries whose present high level of economic development can be traced, in part at least, to the exploitation of their forests, conservation forestry was barely in existence at that time. Thus liquidation of the capital represented by the forest resources, and its transfer to other activities, was unrestricted by the prescriptions of sustained yield forest management. Of course, the so-called "exploiters" of forests hardly set out consciously to transfer capital from forests

to other activities. They set out to make money out of an exploitable natural resource which was available on fairly easy terms, to a large extent because it was regarded as a hindrance rather than as a step to economic development. The impetus to development was the forest devastation which gave life to the conservation movement, but by then a very substantial degree of capital transfer had been effected." Zivnuska (1966) advocated a similar approach to developing countries, while Westoby (1962) wished to rely on sustained-yield forestry.

Increasing exports of the forest sector and its linkages provide the entrepreneurs with several different kinds of investment opportunities, which implicate also uses for different kinds of skills. The relative slowness of the technological change in the forest sector promotes the realization of potential investment opportunities. The characteristic autonomous financing of the forest sector, combined with an elastic choice of production alternatives, has similar effects. Under conditions of economically accessible natural forests, new industrial activity can be initiated with small capital inputs, e.g. through exports of valuable forms of timber. The capital thus obtained can be reinvested in a small-scale sawmilling industry. Investments can then proceed to panel, pulp and paper industries, each of which requires increasing capital and know-how (Zivnuska 1966). The other investment opportunities created by the linkages of the forest industries can also be identified and used.

"First, wood is the only raw material that nearly all inhabited regions of the world have available and can reproduce from existing forests, or could possess by establishing plantations." Priority should be given to industries processing of local raw materials. In most peripheral countries the forest industries can be based on domestic wood raw material. The export value of forest products is high in proportion to the value of the imported inputs they require. Consequently, the forest sector exports

have a positive effect on the balance of payments. (Westoby 1962.)

Forestry, agriculture and income distribution

The financing aspect of the forest sector is next analyzed from the viewpoint of a forest owner and the financing of agriculture. The growing stock of natural forests does not necessarily require any investments or, if it does, they are only at a low level. Furthermore, the forests under proper management can often be an autonomously regenerative natural resource. When the growing stock of a forest is cut down or becomes depleted, it can regenerate itself or be regenerated by man. A forest can, under favourable circumstances, be a production automaton of biomass with a regenerative capability that continues till "eternity". Trees grow predominantly with free natural inputs. Natural regeneration and the "free" increment make it possible to grow wood profitably and ecologically on a large scale with low production expenditures compared to other sectors. Forests are often primarily located on marginal land with no financial or economic opportunity cost.

The more the forests are owned by farmers, the more important is the ownership linkage (Fig. 2.1) between forestry and agriculture. It creates income in the form of stumpage, which is similar to the classical land rent, and provides a new financing possibility for agricultural investments. This becomes more evident with increasing exports of forest products and with improving economic accessibility of the forests. The possibility to grow timber on a large scale with low production expenditures and with low investments liberates the stumpage income of farmers almost totally for allocation in agricultural investment or in saving and consumption. (Saari 1928; Osara 1950, 1958.)

Forest ownership is also advantageous in other ways for agriculture. The forests imply reserve land for agriculture and, they produce wood and gathering goods ("minor forest products") for household purposes. Following the financing

aspects, the supply of labour and effects of income distribution are analysed. The pattern of forest ownership plays a key role in the supply of labour and in income distribution.

Forestry provides both stumpage and employment opportunities. If forestry work and agricultural work are done during different seasons, forestry and agriculture can, in turn, use the same labour and skidding power (horses, oxen, tractors etc). Thus the use of these resources becomes efficient and both activities support each other's existence. If the forest sector increases its exports, through this linkage, a supply of labour force is also created in the periphery where settlements and infrastructure would not otherwise exist (e.g. Saari 1928; Osara 1950; Westoby 1962).

The significance of the ownership patterns of natural resources in income distribution was brought up in the early staple theory (section 22). Since then the role of distributional aspects in economic development have been stressed by a number of authors (Myrdal 1958; Westoby 1978; Myint 1980; Douglas 1983; Hetemäki 1986; Lewis & Kallab 1986). The more forests are owned by private individuals instead of forest industries enterprises, the state or other communities, the more equal is the functional income distribution of stumpage income. The more forests are owned by farmers, the more equal is also the regional income distribution at a certain income level.

The income distribution will be further equalized, if the quantity of forests owned by private individuals or by farmers increases and/or the exports of the forest sector grows. A growth in exports at a prior level of competition or combined with increasing competition among roundwood buyers increases the profitable harvesting of roundwood from more distant forest areas. The economically inaccessible forest areas and roudwood assortments contract, and the forest owners and forestry workers in the new accessible forest areas get stumpage and labor income.

In the first phase of the export of forest sector products the roundwood buyers have the best know-how about the export markets and about the costs of roundwood harvesting and processing. Under such conditions there tends to be a weak demand for roundwood in relation to its supply. There is practically no competition among the roundwood buyers, while the sellers (forest owners) act under competitive market conditions. In such a situation the roundwood buyers possess the original market force. Roundwood and forest holdings can be bought at low prices, and hence the profits of exporting firms may become high. A sustained, strong increase in the demand for roundwood, coupled with expanding forest sector exports, will gradually change the original market situation. Political and economic organizations (unions) of farmer-forest owners may, in the long term, also lead to an increase in the proportion of forests owned by farmers, to an increase in the market force of the forest owners through the help of countervailing power mechanisms and, as a joint effect of the two, to an increase in stumpage income, ceteris paribus (Palo 1981).

The unionization of workers (trade unions) and a respective change in the demand-supply relations may similarly lead to an increase in the labor income in the forest sector. The increase in the stumpage and work incomes of farmers and workers at a certain total income level of the forest sector may take place when the market force of the forest industry enterprises and roundwood exporting firms decreases. The situation leads to profit decreases in these enterprises, ceteris paribus, and to more equal regional and functional income distributions.

In the first phase of the development of forest industries, the economic accessibility of forests, energy and water, and the possibilities for transporting the products determine the location of the different forest industry units. Sawmills, plywood mills, mechanical and chemical pulp mills are located outside large consumer centers, even in developing areas (e.g. Predöhl 1929, Cohn Jr. 1954), and thus have an equilibrating effect on regional income distribution.

In a later phase of development of forest industries, the transport of roundwood, the possibilities of utilizing wood residues, joint operations in energy economy, administration, infrastructure and a decrease in competition all have an effect on the horizontal and vertical integration of production units of the different forest industries into large forest industry complexes, which may become regional growth centers in a national economy (Westoby 1969; Pöyry 1979; Lehtikoski 1987, Annex 11).

The location of new mills can also play a role in another respect, as pointed out by Westoby (1962, p. 20-21) as follows. "External economies of a most important type arise from the fact that forest industries should normally be localized as near as possible to the forests, and hence are normally decentralized in the hinterlands of the regions concerned. This "backwoods" character of forest industries creates a natural tie between them and various infrastructural undertakings. When a new road opens up forests to sawmilling and is used to transport sawn timber to the consuming centers, the economic benefits thus derived may contribute substantially toward amortizing the cost of the road; logging roads may help to extend the regional road system; the establishment of a hydro-electric plant may permit the building of a newsprint mill, which, once in operation, is bound to become a major customer of the electric plant; and so forth. This interrelation is an important feature of forest industries, notably in the early stages of development, and may be a very effective factor in preventing the occurrence of "dualism" in economic growth, that is of a cumulative differentiation between two parts of the same region."

Forests owned by farmers and the location of forest industries tend to have an equalizing effect on the functional and regional income distribution of forest sector income. Equal income distribution, domestic ownership of forests and forest industry enterprises, and a domestic labour force the facilitate creation and realization of

investment opportunities of the consumption demand linkage according to the staple and linkage theories (section 22). Owing to its direct regional effects the forest sector also creates employment, income and infrastructure in developing areas where the conditions for other activities are limited. This aspect was also stressed by Douglas (1983) in advocating fuelwood production and community forestry.

Forest sector vs. other staple sectors

In addition to their direct economic effects, forests have considerable positive social and environmental effects. Forests may be an essential part of the landscape. Forests also satisfy people's need for outdoor recreation. Forests serve as a shelter against wind and erosion, they regulate the cycle of water and climate, and maintain naturally generated plant, animal and microbial species, and thus function as important gene pools. (Westoby 1962.)

According to staple and linkage theories the forest sector, being a mobilizer and activator of economic development, has certain advantages compared with other staple activities. Autonomous financing, a wide flexibility and range of production alternatives, and the social and environmental effects described above are stronger in a forest sector than in most other staple activities. Forestry can be practiced on less fertile soils and in more severe climatic conditions than most forms of agriculture. In the unfavorable conditions of a peripheral country, where there are no comparative advantages for exports based on agriculture, the exports of the forest sector may have comparative advantages. An elastic linkage of forest ownership to agriculture, and the functional and regional equality of income distribution caused by the fact that the forests are principally owned by farmers, separate the forest sector from most other staple activities. Only in farmer-dominated agriculture can equivalent advantages of income distribution be reached.

While the staple theory (section 22) stressed the key role of a staple sector being a dominating export industry, Westoby's

(1962, p. 19) main argument concerned the import-saving effects resulting from expanding domestic production of forest products. Westoby also focused on the vast amount of logs exported from developing countries. The logs are further processed primarily in industrialized countries. In order to get more direct value-added and employment, as well as linkage effects at home, he suggested "expanding sawmilling and plywood capacity by an amount sufficient to satisfy not only growing internal demand but also to substitute exports of processed wood for exports of sawlogs."

The agricultural linkage (Fig. 2.1) was found to be a specific characteristic to the forest sector. This was not identified in the literature used to describe the linkage mechanisms in general (section 22). From the development point of view it may play a key role in inducing agricultural investments, resulting in a rise in productivity as well as supporting the consumption linkage. A strategy of balanced growth in both industry and agriculture in order to avoid a dual economy situation has frequently been emphasized in recent years (Myrdal 1968; Kindleberger and Herric 1977; Todaro 1977; Myint 1980; Douglas 1983; Adelman 1984; IEA 1986; Lewis & Kallab 1986).

The specific characteristics of a forest sector that affects economic development were described above. Accordingly, the forest sector seems to have specific characteristics which provide a basis for the mobilization and activation of economic development. The progress of development depends, however, on certain reservations that are described in the next Section.

25. Reservations on the forest sector characteristics

The realization of the positive development effects of the forest sector in the long range may, however, be hindered by the following specific reservations concerning the forest sector, in addition to the reservations of the general staple and linkage theories (section 23).

In a peripheral country there is a tendency towards inadequate availability of information about the quantity and quality of domestic forest resources, about the economic accessibility of forests, about the characteristics of forest ecosystems, about proper natural forest management regimes, and about the effects of deforestation. This situation hampers planning, implementation and follow-up of policy measures.

The growing stock of trees is, at the same time, both production machinery and a convenient product for marketing or various household uses. In the short term, the rational, private profit maximizing and wide-scale exploitation of tree stands may undermine the socially more profitable, long-term sustained-yield forestry. Pronounced problems in this front have been experienced both in temperate and in tropical zones. However, in the natural closed forests of the humid tropics especially, the question has become accentuated both in respect to ecologically acceptable forest management regimes, and to the financial and economic feasibility for their sustained-yield management (e.g. Leslie 1977, 1987).

Forestry comprises the joint production of both roundwood and other goods and services of forests. Non-wood goods and services of forests are mainly exploited through market-external channels. When subjected to population pressure, industrial logging and fuelwood gathering, jointly with shifting cultivation and other agricultural activities, can create large-scale deforestation. This results in external adverse effects, such as erosion, deterioration of the climate, weakening of agricultural conditions, decreasing energy production, extinction of species etc. (Palo 1984, 1987.)

Accordingly, automatic control by the market mechanism is insufficient to hinder the realization of these reservations. Formulation of an effective forest policy by the respective government to support the economic development is therefore needed. If such a forest policy is not

effective, economically accessible forests will become exhausted and several external adverse effects will arise. Lack of research, statistical information, sufficient education, effective forest organizations and professional staff, as well as the emergence of corruption, hinder an effective and efficient forest policy (e.g. Sartorius & Henle 1968, Palo 1984, 1987). The key role of policy organizations and general peace and political stability for economic development has also been stressed in development literature (e.g. Reynolds 1985).

Since the overall value of roundwood and the primary products of forest industries per unit volume (weight) is low, this means that international transportation of these products over long distances is often unprofitable. Consequently, the unfavorable location of a peripheral country may hinder exports. Since financially profitable wood pulp and paper mills nowadays have to be large, export-oriented, a tiny domestic demand and an unfavorable location may hinder the establishment of such mills. A great number of tree species with a small number of marketable species per area unit, a typical situation in the tropics, may also hinder profitable logging (Westoby 1962).

In this chapter the traditional forest-based development theory was revisited and transformed into a more comprehensive framework. In the following two chapters attempts will be made to apply the framework in order to facilitate empirical observation of forest-based development. First, the entire theoretical framework of chapter 2 will be used as a tool to guide empirical description of forest-based development in a case study of Finland (chapter 3). Second, a few components of the framework will be applied to describe some prospects for developing countries (chapter 4).

3. A PILOT CASE STUDY OF FINLAND

31. Expansion of the forest sector

Leslie (1971) doubted whether Westoby's (1962) hypotheses could be empirically tested. He pointed out that empirical testing by comparing developing countries with each other is hindered by the lack of and unsatisfactory quality of the statistics for developing countries. Instead, Leslie compared 12 industrialized countries over a 12-year period in respect to the significance of their forest sectors for economic growth. Leslie also tried to elucidate the effects of the forest sector on economic development over a period of 33 years in two parts of southern Australia. In the first area the forest sector was important, and in the second area less important. Leslie's first trial gave indifferent results, and the second trial vaguely supported the hypothesis.

Finland provides an interesting opportunity for the empirical testing of the integrated, comprehensive theory of forest sector development (chapter 3). According to Hirvonen and Hjerppe (1984), among 15 leading industrialized countries the real economic growth per capita (2.3 % per annum) in Finland (jointly with Sweden) during the period 1870-1976 has been the second fastest after Japan. On the other hand, during the same period, the forest sector has played a leading role in export activity in Finland (Figure 1.1). Of the countries included in the comparison, Sweden is the only case where the significance of the forest sector in the exports has been comparatively important although not to the same extent as in Finland (Annex 8).

The problem involved in empirical testing the theory of forest-based development is to demonstrate the causal linkages which have existed between the exports of Finland's forest sector and the economic development of the country over the period stretching from the 1860's up until the present day. The various hypotheses and reservations of the theory (of chapter 2, Fig. 2.1) are preliminary tested by describing the economic history and analysing the statistical

data. If empirical testing of the theory of chapter 2 as applied in this chapter to Finland will yield some positive results, then Finland may serve as a baseline country in considering the applicability of this theory for developing countries (chapter 4).

First of all, the share of the forest sector out of the total value of Finland's exports has varied between 37-90 per cent since 1860 (Figure 1.1). The forest sector has thus been the dominating sector of the country's export trade throughout almost the whole period of observation (as assumed in the theory).

The strong expansion of Finnish exports of forest products primarily presupposed a favourable development of external demand. The rapidly industrializing Western European countries (metropoles), and particularly the United Kingdom, created an increasing demand, first for roundwood and sawnwood, and after the First World War also for pulp and paper as well as for plywood. Pulp and paper were first exported to tsarist Russia. When the revolution of 1917 blocked this outlet, successful penetration of the western markets was executed, through joint marketing efforts by a number of private firms. A continuous increase in demand for forest products, coupled with expanding economic growth, has taken place up until today (Figure 3.1). This historical record also supports the hypothesis of comparatively high income elasticities of the demand for forest products.

Another prerequisite for expanding exports in forest products from Finland was her comparative advantages in this sector. Fossil fuels were nonexistent, mineral ores rare and the northern location of the country unfavourable for agricultural production. The local entrepreneurs, already numerous in the middle of the 19th century, had traditions extending over about a century in foreign trade with tar, wooden ships, roundwood and rough sawnwood. The traditional export trade was dominated by the Finnish sailing ships. Finland's location was also rather favourable in relation to Western European markets, especially compared to the United States and Canada, her strongest overseas competitors.

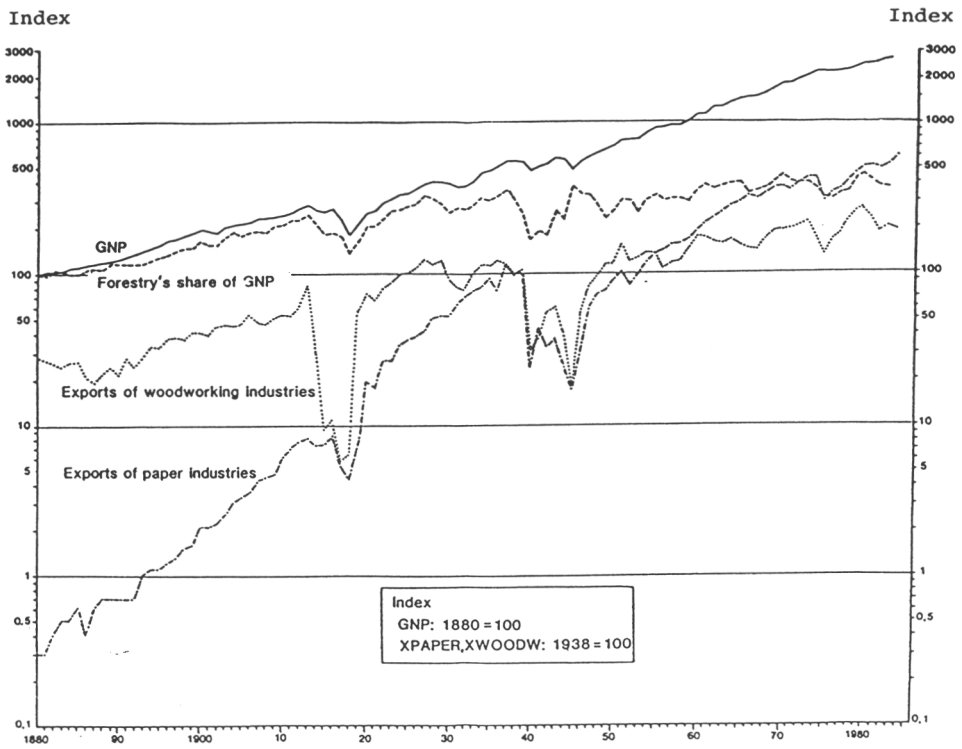


Figure 3.1 Volume indices of total GNP, forestry's share of GNP and exports of woodworking and paper industries in Finland, 1880 - 1980 (Sources: Hirvonen & Hjerppe 1984; Oksanen & Pihkala 1975).

The flow of demand impulses and new technology into Finland was fast under such conditions. Finland was also able to exploit the specific characteristics of wood to a considerable extent. Water transportation of roundwood through the numerous lakes and rivers, and along the long coastal seawaters provided an inexpensive means of transportation. Until the 1970's water transportation

dominated the domestic traffic in roundwood (Uusitalo 1981). Since then road and rail transportation has become predominant. Water transportation saved energy and capital, and facilitated economic accessibility to most forest areas.

The fuel property of wood has also been widely exploited in Finland, not only during preindustrial times but also during about a century of the industrialization. Various wood fuels powered the steam engines of sawmills, railway engines and floating boats well up into this century. Plywood mills, as well as pulp and paper mills, have obtained a substantial share of their power requirements from wood residues and waste liquors. Modern sulphate pulp mills are even net producers of energy.

In addition to traditional fuelwood, the forest sector has produced and utilized wood residues, waste liquor (from pulp mills) and peat for energy. The share of these fuels out of the total utilization of primary energy apparently varied between 75 and close to 100 % during the period 1860-1917, and was above 50 % in 1918-1957. Since then the share has declined to 18 % by 1980. The utilization of such fuel has amounted to 4-5 million tons of crude oil equivalents per annum during the whole period of national independence (since 1917) in Finland. (Jaatinen 1981.)

Next, the empirical formation of the various potential linkages by the Finnish forest sector will be described according to the frame model of Figure 2.1.

The expansion of forest product exports from Finland has been continuous and strong for over a century (Figure 3.1). Such a large-scale development had not been possible in the restricted domestic markets. The expanding foreign demand, combined with the domestic natural forests and other comparative advantages, have induced investments in various branches of forestry and the forest industries, and thus made a marked direct contribution to Finland's economic development in the form of value added, income distribution and employment. The direct contribution of the forest sector

to GNP was at its highest 26 % in 1920, and still 16 % in 1960 and 12 % in 1980 (Hirvonen and Hjerppe 1984; Pellervo 1986). Since the peak period of 1920-1924, the share of the forest industries has remained stable (7-8 %) whereas that of forestry has declined from 18 to 5 %. This share includes neither the transportation of roundwood and processed products nor respective services.

The share of forest industries out of the total gross capital formation by all the manufacturing industries was above 50 % in 1960 and about 33 % in 1970 (Tilastokeskus 1975). The structural changes in forest sector production and export since 1860 have been considerable (Figures 1.1 and 3.1) Sawmilling and roundwood dominated first, and later on the paper industry. The emergence of internal forward linkages of the Finnish forest sector are described in three stages: preindustrial, early industrial and mature industrial stages (Figures 3.2, 3.3 and 3.4). The forest sector has greatly diversified since 1850. New technology was imported during the early phases but towards the end of the 19th century more reliance was put on domestic research and development.

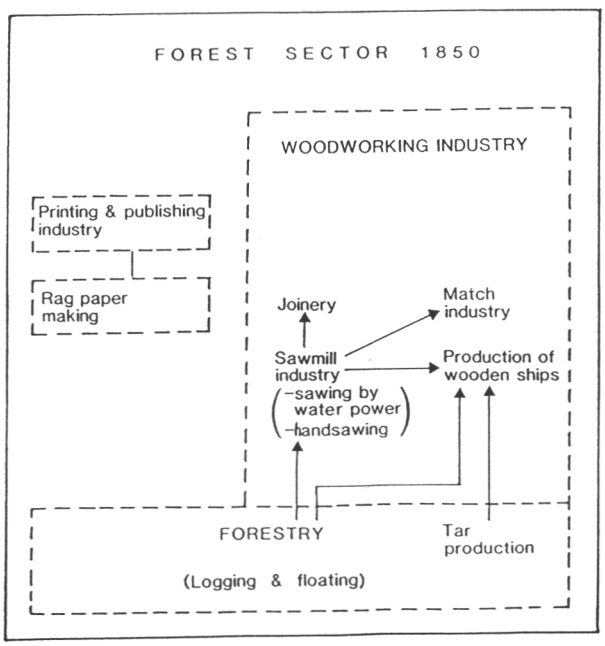


Figure 3.2 Internal linkages of forest sector in 1850 (the box 1 of the Figure 2.1 in preindustrial stage).

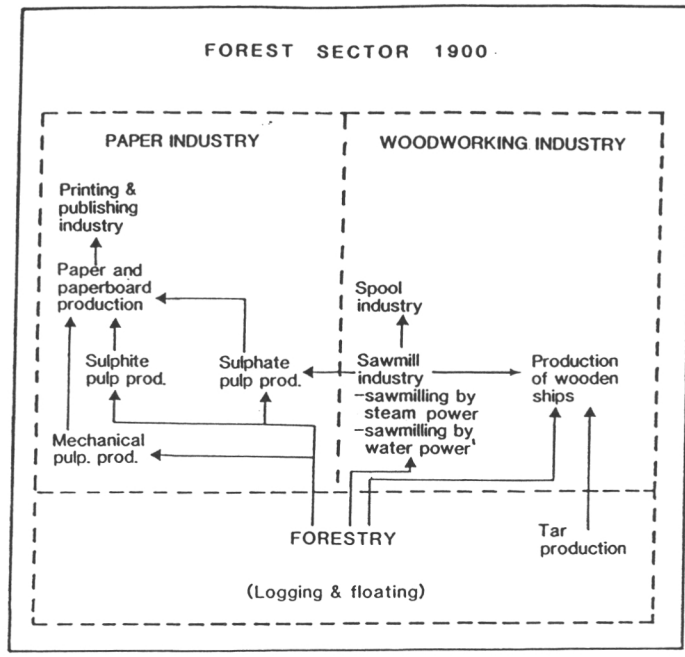


Figure 3.3 Internal linkages of forest sector in 1900 (the box 1 of the Figure 2.1 in early stage).

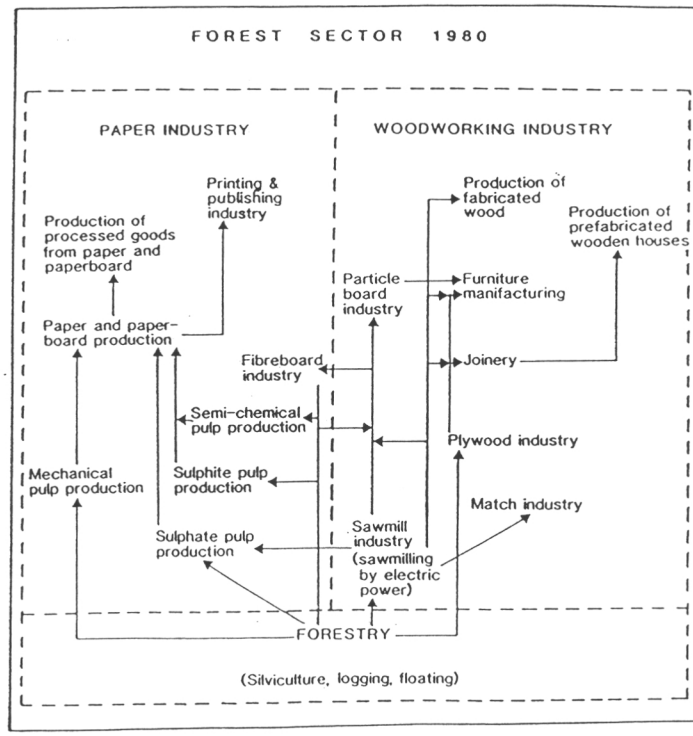


Figure 3.4 Internal linkages of forest sector in 1980 (the box 1 of the Figure 2.1 in mature state).

32. Linkage effects of the forest sector

Backward and forward linkages

The most important backward and forward linkages of the Finnish forest sector have been identified in order of significance for the year 1970 (Figure 3.5). Some branches appeared as both backward and forward linkages of the forest sector. For instance, the share of the forest industries has been about 60 % out of the total energy consumption by all manufacturing industries but, on the other hand, as described above, the forest sector is also a considerable producer of fuel and energy. An example of material-based backward and forward linkages of the Finnish forest industries was provided by Wallin (1975; Figure 3.6).

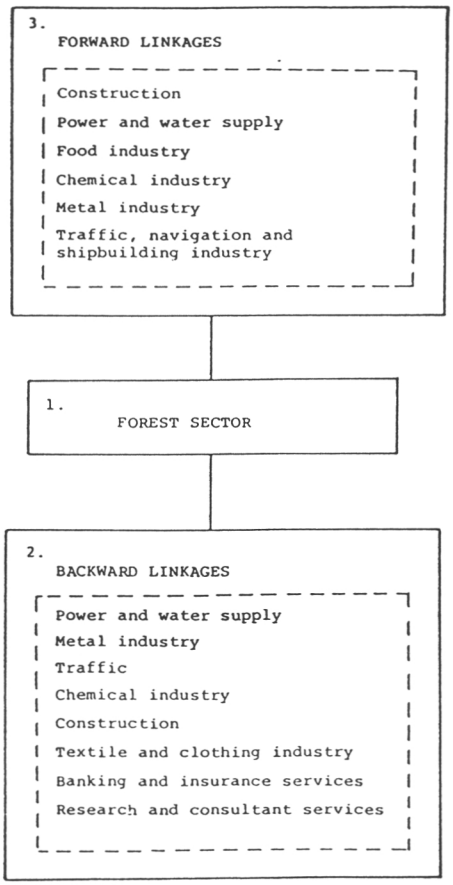


Figure 3.5 The most important backward and forward linkages of the forest sector of Finland in 1970 (the boxes 2 and 3 of Figure 2.1; source Tilastokeskus 1977, modified).

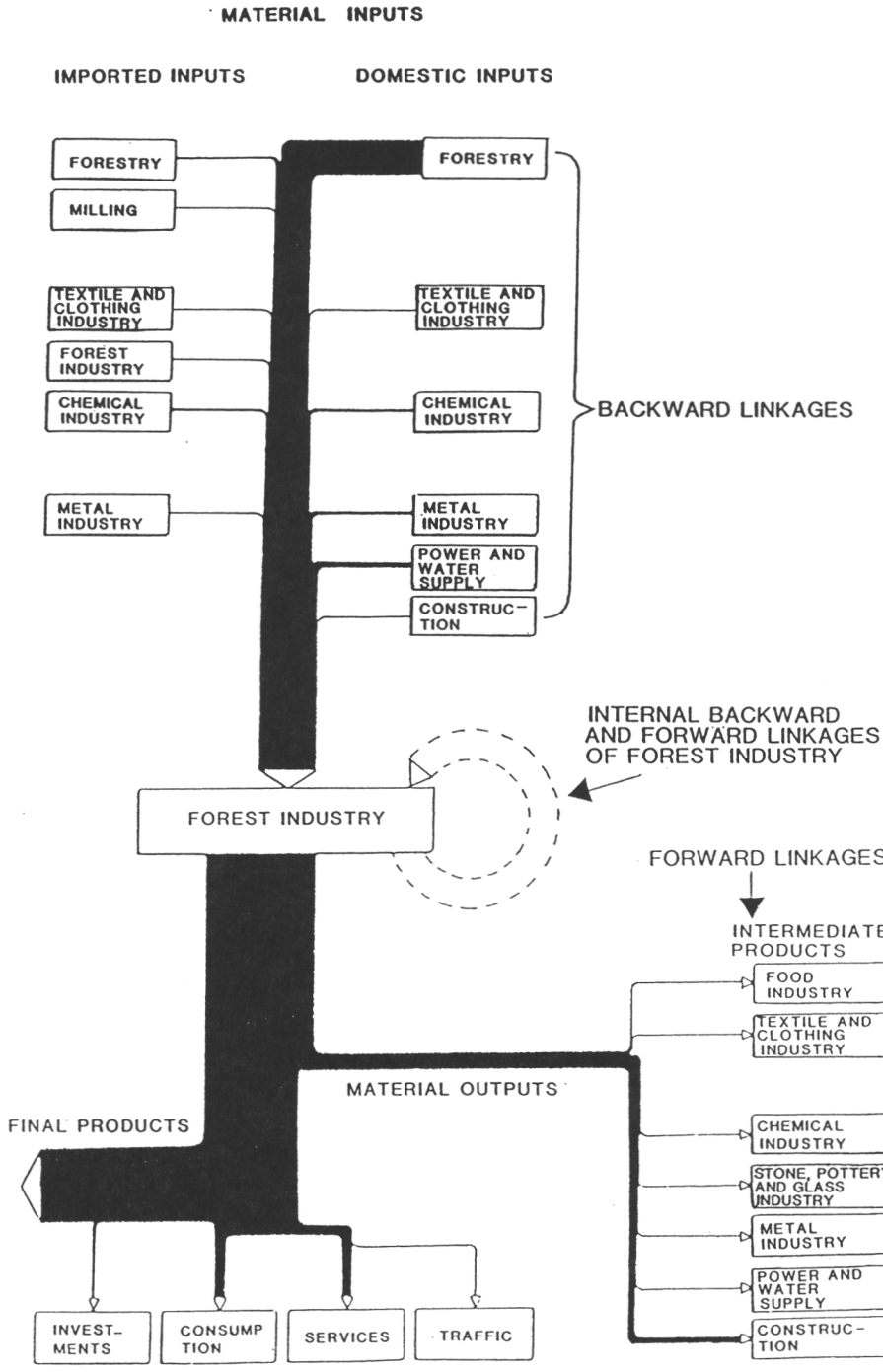


Figure 3.6 Backward and forward linkages of the Finnish forest industry in 1965 (Wallin 1975).

The relative size of the backward and forward linkages were recalculated by branches from the national input-output tables (Table 3.1). The results consist of both internal and external linkages of each sector. The percentages refer to the ratio of an industry's purchases of inputs from other domestic industries to the total value of its output (backward linkage) and to the ratio of an industry's sales of its products to other domestic industries to the total value of its total sales (forward linkage). The branches were organized according to the sum of the backward and forward linkages within the group of primary industries on the one hand, and within the group of processing industries on the other hand.

The sum of the backward and forward linkages of each of the six forest-based branches were higher than the average for all sectors in the Finnish national economy (Table 3.1). By definition, the primary industries have weak backward linkages, particularly in the case of forestry, and strong forward linkages (Hirschmann 1965). The paper and board production branch has relatively weak forward linkages due to its high share of exports.

In this paper the following empirical findings, according to the above principle for 1982 in Finland, were arrived at. An increase of FIM 100 million in the final demand produced an increase in production through direct and indirect effects by an average of FIM 185 million within five forest-based subsectors, as compared to an average of FIM 167 million within the other 29 subsectors of the Finnish economy. When considering the primary and processing industries separately, forestry's response was FIM 110 million, whereas the average response of four other primary industries was FIM 162 million; the average response of four forest industry branches (woodworking, non-metallic furniture, pulp, paper and paper products, printing and publishing) was FIM 185 million, whereas that of 13 other processing branches was FIM 174 million. (Recalculated by the author from Pellervo 1986, p. 147; see also Annex 1.)

Table 3.1. Relative sizes of backward and forward linkages by branches of the economy in Finland in 1970 (source: Tilastokeskus 1977).

		Backward linkages	Forward linkages	Total linkages
A	Primary production:	%	%	
	Agriculture	49	77	126
	Other mining	28	90	118
	Forestry	7	86	93
	Mining of ores	16	77	93
	Fishery	9	28	37
B	Processing: industries:			
	Other metals	88	82	172
	Milk	94	36	130
	Iron and steel	43	74	117
	Pulp	63	51	114
	Sawmilling	67	39	106
	Paper and paperboard products	57	49	106
	Industrial chemicals	39	66	105
	Other wood-working	50	50	100
	Metal products	28	64	92
	Textiles	40	49	89
	Paper and paperboard	63	22	85
	Oil	8	76	84
	Plastics	16	54	70
	Machinery	31	36	67
	Average of all branches	44	60	84

The investment opportunities and their likelihood to become realized as created and induced by backward and forward linkages are principally different. The former are demand-induced and the latter supply-induced. Hence, it has been argued that forward linkages are weaker than backward linkages and their realization more uncertain (Hirschman 1965; Pellervo 1986). In the short term it may be the case, but in the long term (during several decades) the investment opportunities also created by forward linkages must, along with the favourable demand conditions, come under serious consideration. In fact, this is one central theme of the staple theory: different staples differ in their characteristical technological applications. The role of each type of linkage has to be considered case by case. For instance, the largest value for backward linkage within the forest-based subsectors is for sawmilling, but only in exceptional cases has new forest been induced by sawmilling; instead the sawmills must mostly be regarded as having been induced through forward linkages of existing forest (cf. the case of grain milling and wheat cultivation by Hirschman 1965, p. 107-108).

Missing linkages or low relative linkages can be compensated by larger exports of the staple products concerned, combined with effective economic policy. In Finland's case, large-scale exports and higher than average backward and forward linkages coincide in the forest sector. Interestingly enough, the linkage results of this paper support the early findings from United States, Japan, Italy and Norway of more than average strengths of the forest sector linkages (Westoby 1962; Hirschman 1965), although this should be treated with some caution owing to the somewhat different definitions of the subsectors.

Investment linkages

Investment and backward linkages are related in such a way that, in both cases, investment opportunities are created or investments in other sectors are induced through increases in respective demand.

The subsectors of the forest sector have bought the inputs for a fixed capital formation from metal & machine industries, construction, transport and banking & insurance, in particular, (Figure 3.7). These domestic investment linkages of the forest sector were important as early as during the last century, and became significant during the period between the two world wars. The share of forest industries out of the gross formation of the fixed capital of all industries was more than one half in 1960, and still one third in 1970 (Tilastokeskus 1975). Accordingly, the key role of forest industries as a generator of Finland's metal & machine industries and construction lasted well into the post-war period.

The period of the 1920's and 1930's may serve as an illustrative case. The pulp and paper industry increased its production volume by a factor of five, printing and publishing by four and woodworking by 2.5. Such large production increases were based on expanded investments, combined with increasing investments in agriculture, that were substantially financed through forestry income. Both of them induced investments in the domestic metal and machine industries. War indemnities later on formed an additional spur to these industries, and accordingly became increasingly export-oriented. The exports of Finnish forest industry machines started in the early 1950's, and that of forestry (mainly logging) machines in the early 1970's. A protectionist tariff policy was followed up until the end of the 1950's.

The recalculation perfomed by the present author from the input-output table for Finland (Pellervo 1986, p. 147) produced the following empirical findings for 1982. An increase of FIM 100 million in the final demand "induced" a derived effect due to investment linkages as follows: FIM 388 million as the average for the five forest-based subsectors, but FIM 357 million as the average for the other 29 sectors of the Finnish economy. The respective responses were FIM 330 million for forestry, and an average of FIM 379 million for

the other four primary sectors; an average of FIM 402 million for the four sub-sectors of the forest industries, and an average of FIM 330 million for the other 13 processing sectors. (see also Annex 1.)

Consumption linkages

The investment opportunities and investments induced by the increase in household incomes through expansion of the forest sector (Elovirta 1979) production have occurred in such branches as foods and beverages, clothing, trade, housing, electric and heating power, transportation, information and communications, as well as in health services in particular (Figure 3.8).

The attempt to estimate empirically the magnitude of consumption linkages was based on an input-output study (Pellervo 1986, p. 147). An increase of FIM 100 million in the final demand would result in an increased production through derived consumption effects of FIM 293 million as the average for the five forest-based subsectors, and respectively of FIM 261 million in the other 29 sectors; or FIM 232 million in forestry and an average of FIM 264 million in the four other sectors of primary production, as well as an average of FIM 308 million in the four subsectors of forest industries contrasting an average of FIM 256 million in the other 13 sectors of manufacturing industries.

The assessment of consumption, as well as investment linkages, through input-output studies is bound to numerous reservations, but it does represent the only quantitative approach available. The empirical results show that the forest sector may have had stronger consumption linkages than the other 29 sectors of the Finnish economy as the average.

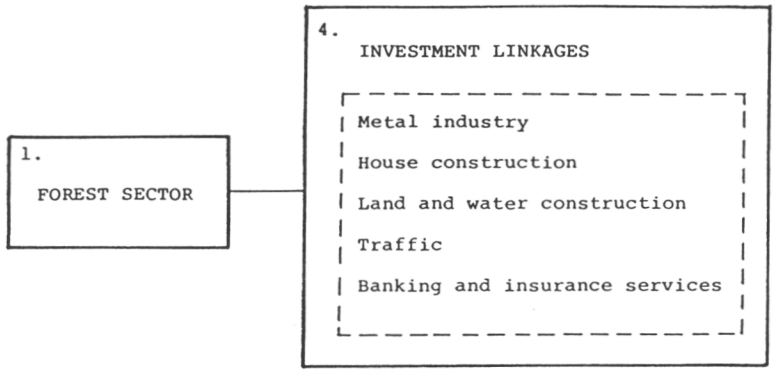


Figure 3.7 The most important investment linkages of the Finnish forest sector in 1970 (box 4 of Figure 2.1).

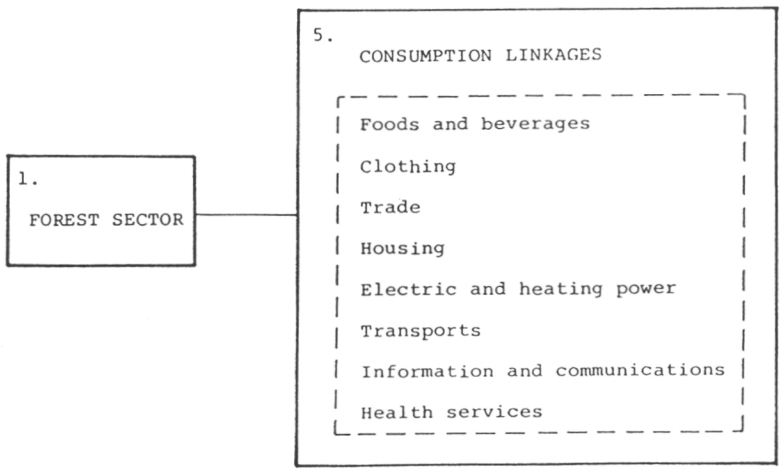


Figure 3.8 The most important consumption linkages of the Finnish forest sector in 1970 (box 5 of Figure 2.1).

The regional income distribution in forestry in 1970 was more equal (the share of the three largest administrative districts (lääni) was 37 % of the total) than that in agriculture (52 %) and in the national economy on the average (52 %). The regional income distributions the woodworking and paper industries (46 % and 60 %) were also more equal than the average for all the manufacturing industries (63 %; Figure 3.9). The respective share for the forest sector as a whole was 48 %, and thus more equal than the national economy as a whole. The same exercise was repeated by computing the shares for the six largest districts, instead of only three, but the results remained approximately the same. Accordingly, a farmer-dominated forest ownership pattern, as well as the location of forest industries outside large consumption centers, have affected the respective income distribution as assumed in section 24.

Regional income distribution has, according to the same (three district) criterion, become somewhat more concentrated during the period 1960 to 1978:

	1960 %	1978 %
Forestry	33	35
Forest sector	46	50
Total GNP	54	57

The assumption can be made that the equality of the forest sector's income distribution was at its highest level around the year 1960. During the earlier stages of development the accessibility of logging and profitability in mill construction have apparently favoured against 'hinterland' districts. (Results recalculated by the author from Tilastokeskus 1975, 1982.)

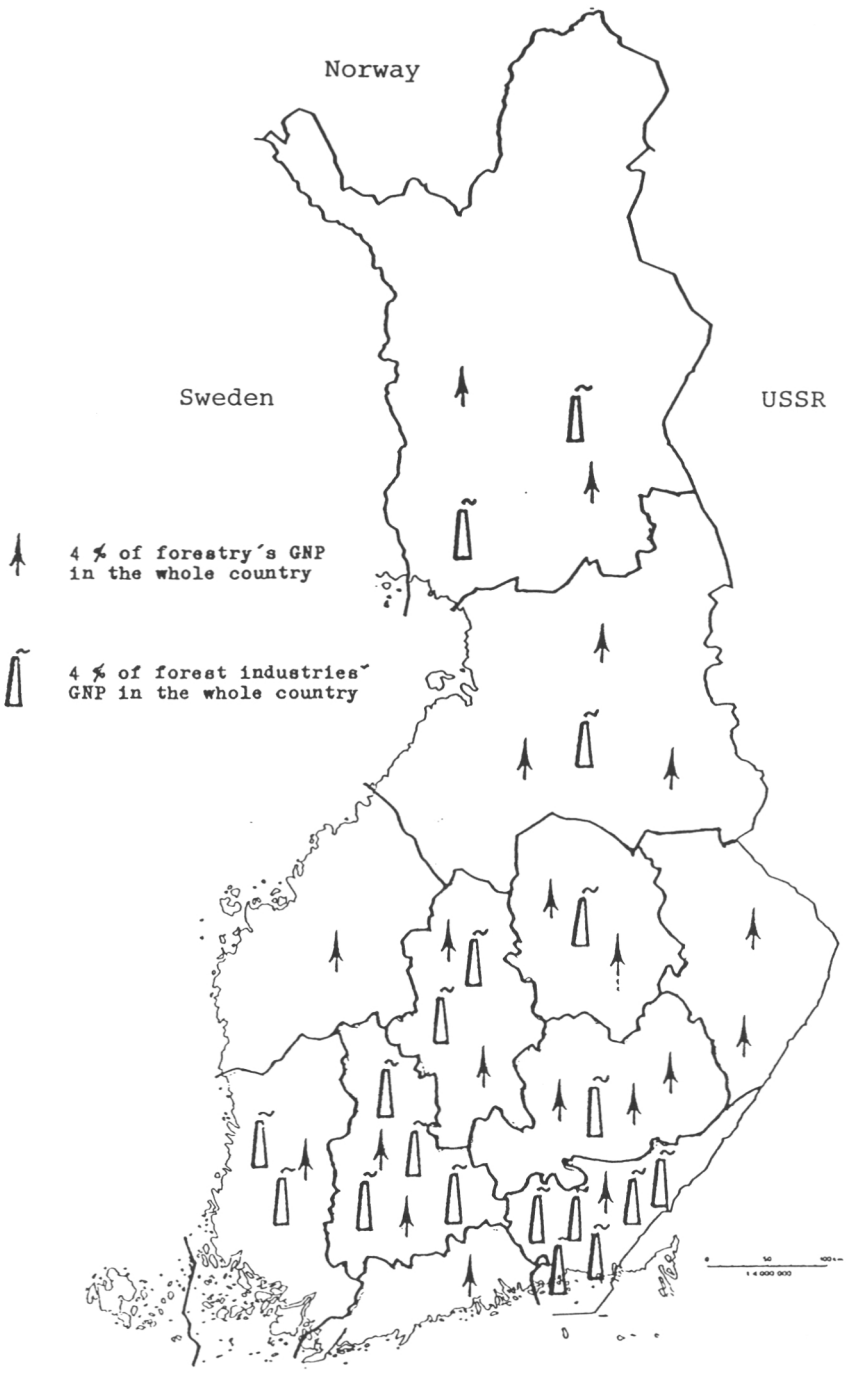


Figure 3.9 Regional distribution of forestry and forest industries in Finland in 1970 (Seppälä 1976).

The change in the functional income distribution was estimated as the shares of the labour and capital incomes of households and of the capital incomes of forest industry enterprises out of the value added of the forest sector. The share of households in the beginning of this century was 57 % and in the late 1970's 70 %. The share of forest industry enterprises accordingly decreased 13 percent units during the rather long time period. (Hjerppe at al. 1976; Kunnas 1973; Tilastokeskus 1982; see also Elovirta 1979.)

The equality of the forest sector's regional income distribution compared to the rest of the national economy, as well as the balancing of functional income distribution, have, according to the staples theory, assisted in the formation of the production of domestic consumption commodities and its expansion through consumption linkages of the forest sector. The strong growth of the home-market industry between the two world wars was also supported by the protective tariffs (Hirvonen and Hjerppe 1984) with which it was possible to reduce the marginal propensity to import consumption goods.

Agricultural linkages

The equalization of the forest sector's functional income distribution has also strengthened its agricultural linkage. A considerable part of the previously described consumption linkages have come about through farmers being forest owners and forest workers. The agricultural linkages of a forest sector are, however, defined as having a character independent of final demand linkages (investment and consumption linkages). Agricultural linkages may appear under joint ownership of agriculture and forests (or forest industries). Agricultural linkages consist of stumpage income, wage income, alternative (rotational) use of resources, household use of forest products and benefits accruing from the protection afforded by forest for agriculture (against wind and erosion etc. Figure 3.10).

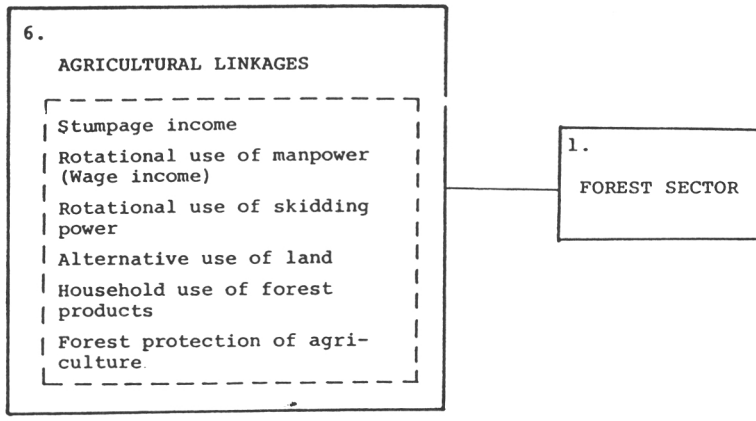


Figure 3.10 The agricultural linkages of the Finnish forest sector (box 6 of Figure 2.1).

The agricultural linkage has held a key position in the financing of the considerable investments required for the modernization and mechanization of Finnish rural economy from a subsistence economy to a barter economy. The farmers have been Finland's most important group of forest owners throughout the period of strong expansion of the forest sector. Several effective land reforms have been implemented in Finland in order to increase the individual farm ownership of fields and forests (e.g. Salmi 1988). The main part of the value added of forestry up until the 1940's was available to the farmers for agricultural investments, consumption and saving (Figure 3.11). Prior to the 1940's timber production hardly needed any investments in private forests. The share of forestry investments out of farmers' stumpage income is still low when compared with agriculture and manufacturing industries.

Forest incomes have played a strategic role in economic development, not only as a 'free' financer of agricultural investments but also in respect to the high development potential inherent in this sector. Agriculture had the

strongest backward, investment and consumption linkages among the five primary sectors, its forward linkages were the third strongest, close to forestry. The food industry's forward linkages were rather low, but all the other three linkages were strongest among the 17 manufacturing industries. (Table 3.1 & Pellervo 1986, p. 147.) Accordingly, the joint expansion of forestry and agriculture has contributed favourably to economic development. The key role of agriculture has been frequently stressed (e.g. Todaro 1977; Myint 1980; Douglas 1983; Adelman 1984; Hetemäki 1986). (see also Annex 1.)

The sharp reduction in the 1960's in the previously profitable, seasonally rotational use of labor and horse power in forestry and agriculture, along with increasing mechanization broke up the subsistence of numerous small farmers in the peripheries of Finland. This was one factor behind the rapid migration from the countryside at that time. The agricultural linkage of forestry has lately been based to only a small degree on the traditional seasonally rotational use of labor and capital factors, but dominantly on the stumpage incomes. On the other hand, the stumpage incomes, too, have begun increasingly to by-pass the farmers due to rapid changes in the forest ownership pattern. Accordingly, the traditionally strong agricultural linkage with forestry has lately weakened decisively.

The other components of the agricultural linkage (Figure 3.10) have played varying roles in Finland's economic development. New fields have been cleared from previous forest lands. The multiple use of forests for household purposes has been significant, especially during earlier phases. The domestic utilization of roundwood (mainly fuelwood) by farms was still about one third of the total removal in the mid 1950's, but it has since decreased to below 10 %. The protective functions of forest have played a minor role in Finnish conditions.

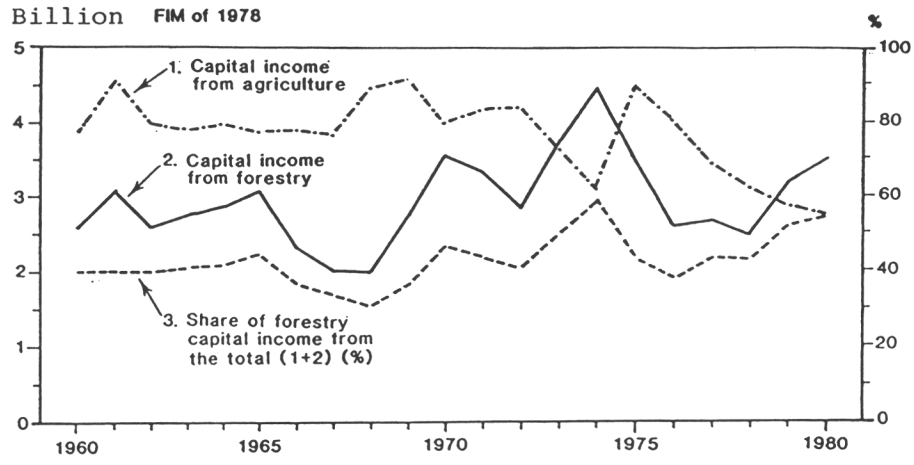


Figure 3.11 Forestry and agricultural net capital incomes of Finnish farmers in 1960 - 1980 according to the national income statistics (Heikinheimo & Kakkuri 1982).

33. Overcoming theory reservations

A number of reservations for forest sector-based economic development were presented in Sections 23 and 25. Foreign factor ownership has played a minor role in Finland's forest sector. Practically all forests have been in domestic ownership since 1918, and prior to then about 98 %. The great majority of new entrepreneurs in the Finnish forest sector in the late 19th and early 20th centuries were Finnish merchant houses or Finnish nationals. A minority of 22 foreign entrerepreneurs were identified by Raumolin (1985), most of whom disappeared already until 1918. Nowadays, no foreign ownership and control exists in the Finnish forest sector.

Canada, in contrast, has been charasterized by considerable foreign ownership (nearly 50 % in 1979) of her forest industries. Foreign investments may have had some benefits for Canada, such as an accelerated rate of investments, a better access to international markets, and new managerial and financial inputs. The benefits of direct foreign investments in Canada have been forfeited in the following ways: first, too much dependence on the US market; second, low motivation to produce higher value goods in Canada; third, a loss of autonomy over strategic decisions; and fourth, a low level of research and development in Canada. (Hayter 1985.)

Finland has been able to create an effective system of research, development, education, training and extension, especially during the period of national independence stretching back to 1917. This system has supported economic development based on expansion of the forest sector in many ways. For instance, the composition of forest products exports has been transformed towards more processed goods such as printing and writing paper and coated plywoods. The Finnish exports consist of less roundwood and more paper than the average for the developed market economies, and particularly so compared to the socialistic and developing countries (Figure 3.12). Of particular interest in this respect is a comparison between Finland and Canada (Kiljunen 1986):

Share (%) of total world exports in 1981

	Canada	Finland
- pulp	34	9
- newsprint	60	11
- other paper and board*	5	15
- total pulp and paper	25	12

* (recalculated by the present author)

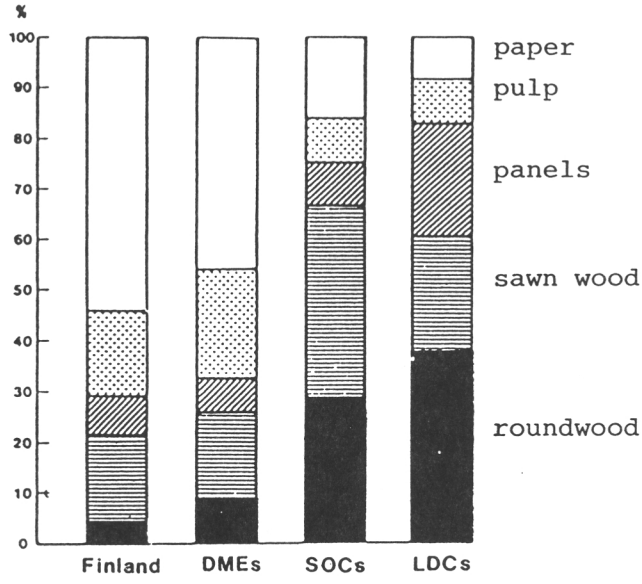


Figure 3.12 Forest products export composition of Finland and major regions, 1981 (Kiljunen 1986).

The group of "other paper and board" consists of such products as printing and writing paper, household and sanitary paper, wrapping and packaging paper and board as well as special types of industrial paper which are generally more highly processed than newsprint. Finland's share of total world exports in this group is three times higher than Canada's respective share. Viewed from another angle, the shares of this higher processed group out of the total exports of pulp and paper in each country in 1981 were as follows: Finland 57 %, Sweden 51 %, USA 51 % and Canada 11 % (Kiljunen 1986). These findings may also support the above

hypotheses made by Hayter (1985) concerning the disbenefits of foreign ownership of the Canadian forest industries.

Already in the 1930's most of the machinery and equipment for the new forest industry mills, with the exception of paper and finishing machines, were produced in Finland. As a result of the war effort and subsequent war indemnities, there was an increase in domestic research and development. Gradually the production of paper machines was also started in Finland, first for domestic markets but then also to a growing extent for export. The exports consisted of 49 machines up to 1960 and 62 machines during 1961-1973. This breakthrough in exports was followed by other forest industry and forestry machines, as well by other metal and machine industry products. Finnish engineers were primarily responsible for the design of new mills already during the 1930's. Ekono Oy and the Jaakko Pöyry-group have been the leading consulting firms in the forest sector since 1911 and 1958 respectively. The latter has become one of the leading consulting firms in the whole world. Exports of other know-how have also expanded. (Raumolin 1985.)

In the middle of the 19th century Finland's forests were widely exploited by shifting cultivation (Raumolin 1987), tar distillation, shipbuilding, traditional sawmilling, household utilization of fuel and construction wood, and grazing and wild fires (Figure 3.13). The country also experienced the last wide-scale and long-lasting famines during the latter part of the 1860's. Rapid forest-based industrialization was only feasible in those regions where large watercourses enabled the floating of timber from previously inaccessible forests using recent innovations in floating (e.g. by passing rapids). Western Finland (Ostrobothnia) was previously a leading region in forest-based exports, but could not participate in this new industrialization process owing to the overexploitation of its forests and the lack of extensive watercourses between the Kokemäenjoki and Oulujoki rivers.

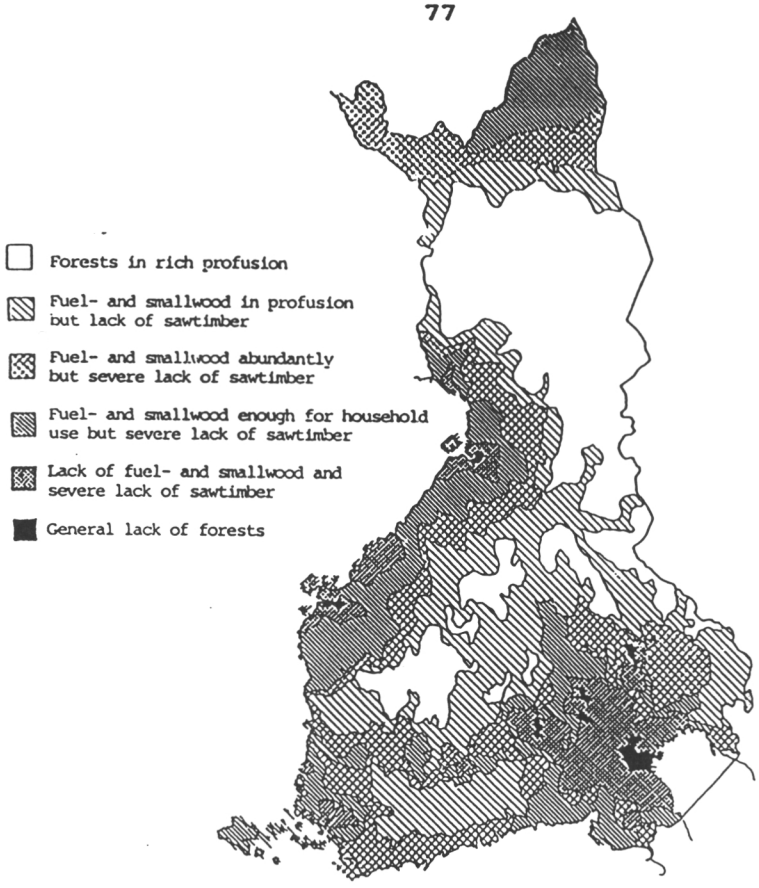


Figure 3.13 Assessment of forest resources in Finland around 1850 by C.W. Gyldén (redrawn from Laitakari 1960 by the author).

Overexploitation of the forests was a real threat in Finland up until the 1920's and 1930's, when the Finnish Forest Research Institute, established in 1917, produced the first results of the national forest inventories and wood utilization studies. The assessment of forest resources in the late 1960's (Figure 3.14) gives a rather opposite picture comparison to that in Figure 3.13. The present forests are assumed to contain a higher volume of growing stock than at any time since the 1850's (Kuusela 1972, 1978). How has a change of this sort been possible considering the strong expansion of the Finnish forest sector production? The question is also relevant as regards the present situation in the developing countries, but can only be briefly discussed here.

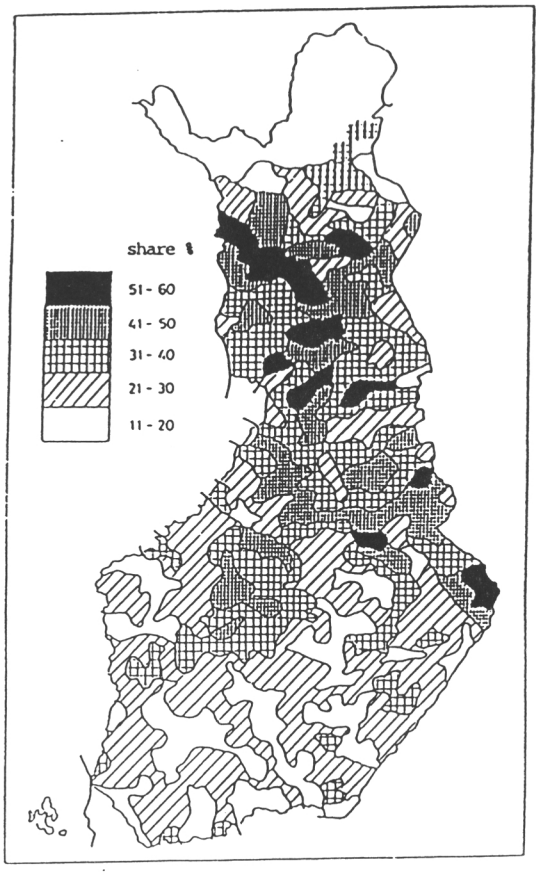


Figure 3.14 Assessment of forest resources in Finland in the late 1960's: the share of clear-felled and pre-thinning stands of the total forest area (Kuusela 1974).

The deforestation that took place up until the 1860's in Finland resembles to a great extent the accelerating deforestation process that is currently occurring in developing countries as described by Palo (1987). It is powered by a vicious circle of population growth, rural depression, poverty and a number of other factors. Finland, however, was different in a few key respects: cleared forest (at its greatest 4-5 million hectares) regenerated naturally without any erosion and its serious consequences, forests were predominantly in private ownership, practically no

corruption appeared and the market mechanism in roundwood and other factor markets functioned effectively.

The increasing demand, interacting with a somewhat inelastic supply, first led to higher stumpage prices and, along with the new capacities in forest industries and new floating innovations, to wider economic accessibility of the forests. Hence, the value of the forests started to grow rapidly after the 1870's (Kunnas 1973). The role of the forests began to transform from a hindrance to development into an important vehicle of development. Forests became worth while owning and protecting. The government established a state forestry administration during the 1850's, forester education during the 1860's and new forestry legislation in 1886. The Finnish Forestry Association was created during the 1870's to promote private forestry.

An important technological change took place when iron, steel and steam power replaced traditional wooden sailing ships- the distillation of tar subsequently decreased and ceased at in the beginning of this century (Figure 1.1). The forestry income of the farmer forest owners speeded up the transformation from a subsistence economy to a barter economy, and was a decisive impetus for the intensification of agriculture. Consequently, shifting cultivation, wild fires and forest grazing gradually disappeared. Expansion and consolidation of private forest ownership, combined with more effective education, research, forestry administration and extension, as well as new laws for private forestry during the first decades of the 20th century, supported the gradual transformation from traditional exploitative forestry to sustained-yield forestry.

Land reforms (for more details see Salmi 1988) and structural changes in the Finnish economy, as well as a decrease in population growth, and a wide-scale emigration to North America, also helped to release the rural pressure on forests. An increase in real stumpage prices removed the comparative advantages of large scale exports of roundwood. A large-scale forestry investment program (Mera) became a

viable proposition and was subsequently implemented since the 1960's (Ervasti et al. 1970). Especially since the 1950's, fuelwood was replaced to as ever-increasing extent by oil and electricity. These changes were fundamental in avoiding the most recent threat of overexploitation of forests in the early 1960's, which was a time when the Finnish forest industries experienced rapid expansion supported by such economic policy measures as the devaluation of the Finnish Mark in 1957 and membership of the European Free Trade Association (EFTA). (Kuusela 1974, 1981.)

34. The forest sector and economic development

Foreign trade

The share of exports out of GNP has varied in Finland from 20-33 % since 1890. The volume of exports grew by 3.7 % and the volume of imports by 4.4 % as annual averages between 1880-1980. The ratio of export prices to import prices increased by 60 % during this extended period (see also Annex 9). This has lessened Finland's foreign indebtedness and promoted economic development. The substantial forest sector exports have thus permitted even larger imports of grain and other consumer goods up until the late 1930's, but primarily of capital goods and raw materials throughout the whole period. The share of consumer goods declined from 44 % in 1880 to 13 % in 1980. (Hirvonen and Hjerppe 1984.)

It was assumed (section 24) that expanding production in a forest sector will have a positive effect on the balance of foreign trade. The import share (%) of final products in primary and manufacturing industries in Finland in 1980 was, according to an input-output study (Forssel 1985, p. 99), as follows:

	Forestry	Forest industries	Agriculture	Consumer goods	Metal industries	Other industries
Direct imports	1	5	4	14	19	44
Indirect imports	1	10	12	16	14	10
Total imports	2	15	16	30	32	54

Thus, for instance, the final products of the forest industries consist of 5 % of direct imported inputs, and 10 % of indirectly imported inputs (these refer to purchased domestic inputs that also contain their imported share). The import shares of forestry and forest industry products appear low in comparison with agriculture, but particularly so when compared to other manufacturing sectors. In fact Tuomainen (1978) argued that the forest sector was the only one to produce a net surplus in foreign trade when the Finnish economy was divided into four similar sectors based on forestry, agriculture, metals and energy & others, and each including both primary and processing industries.

The forest sector and GNP

The expansion and diversification of the Finnish forest sector was described above (section 31). Increasing demand for forest products and the versatility of forestry's forward linkages have been the two principal factors promoting this development. While the volume of agriculture grew by 1.1 % annually during 1880-1980, the respective growth figures for forestry and all manufacturing were 1.5 % and 5,3 % (Hirvonen and Hjerppe 1984). The share of forest industries out of the total production of all manufacturing has varied between 20-35 % during the same period (ibid). The paper industries have grown faster than the wood working industries (Figure 3.1).

A considerable majority of forest industry products have been exported. The vast exports of the forest sector have benefited economic development in the ways described above. Increasing production has had a direct effect on GNP measured as the share of the forest sector out of GNP. Part of the linkage effects may become realized in the short term, but another part in the long term. The potential effects of the forest sector on economic growth were first assessed here using simple correlation analysis, assuming that a positive relationship would reflect a positive effect that would consist mainly of the direct effect and to a lesser degree of linkage effects. The computations were made for the whole period 1880-1980, and for a few shorter periods of special

interest. The last three periods intentionally overlap each other. War time and certain subsequent crises periods have been omitted in the shorter periods, but are included in the overall period. The results are shown in Table 3.2.

During the whole period 1880-1980 the exports of the paper and woodworking industries, as well as those of the total forest sector, correlated positively and strongly (as assumed) with GNP. The forestry exports mainly consisted of roundwood, and had no correlation with GNP. The exports of the paper industries correlated with GNP as strongly as the total exports (+0,98). During the first subperiod 1890-1913 the exports of the three subsectors of the forest sector correlated approximately as strongly with GNP. The role of forestry and also that of the woodworking industry declined the most in this respect during 1921-1938. Since 1948 the exports of forestry have lost their earlier positive correlation with GNP, but the exports of the woodworking industries retained it somewhat. The exports of the paper industries have maintained their strong positive correlation with GNP throughout all three subperiods. (Table 3.2.)

Table 3.2. Correlation coefficients between volume of GNP and volume of forest sector exports and total exports in Finland in 1884 - 1980.

	1884 -1980	1890 -1913	1921 -1938	1948 -1980	1957 -1974	1967 -1980
Exports of forestry	-0.01	0.95	0.32	-0.73	-0.79	0.16
Exports of wood-working industries	0.87	0.96	0.62	0.75	0.77	0.39
Exports of paper industries	0.98	0.95	0.94	0.95	0.97	0.62
Exports of the forest sector	0.93	0.95	0.83	0.83	0.81	0.32
Total exports	0.98	0.97	0.97	0.99	0.99	0.92

The simple correlation coefficients given in Table 3.2 supported the previous hypothesis of sections 22 and 24 and the empirical findings of sections 31-33 as regards the effective direct role of the forest sector in economic growth. More verification would require proper econometric analysis. The more indirect and derived effects are analysed under the next heading.

Linkages of the forest sector and GNP

The linkage network consists of backward, forward, investment, consumption and agricultural linkages as described above (sections 22 and 32). A forest sector is linked to the rest of the national economy through this network. Accordingly, the linkage network transmits expansions and contractions of the forest sector to the rest of the economy. The wider and more diversified is the network and the stronger the impulses from the changes of production the stronger the linkage effects the forest sector has on economic development.

As a first approximation correlation coefficients between the lagged volumes of forest sector exports and GNP in Finland during 1884 - 1980 were computed (Annex 2). The strengthening of the key lagged correlations from the early subperiod to the terminal subperiod was interpreted to reflect the realization of new linkages.

The effects of backward, investment and consumption linkages were assessed for twelve sectors of the Finnish economy in 1982 (Figure 3.15). The first bar consists of direct and backward linkage effects, the second bar adds consumption effects to the first bar, and the third bar is a total cumulative sum which also includes the investment effect. Food industries have the largest combined linkage effects (third bar), next come forest industries equally with agriculture and electric power & waterworks. Forestry has lower combined linkage effects than the former, but they are higher than those of the chemical industries and of about the same size as the effects of other manufacturing

branches, construction and trade. While agriculture and food industries both have large linkage effects, forestry is connected to them via its agricultural linkage. On the other hand, while the electric power & waterworks branch also has large linkage effects, the forest industries have their strongest forest sector-external linkages with it.

The results have to be interpreted as quantitative approximations based on an input-output study (Pellervo 1986). Forest industries have the second largest linkage effects among the 12 sectors of the Finnish economy shown in Figure 3.15. The linkage effects of forestry are lowered by the fact that Figure 3.15 excludes all forward linkages, in which forestry had the second highest score (Table 3.1) as well as the specific agricultural linkage of forestry which has played a major role in financing agricultural investments.

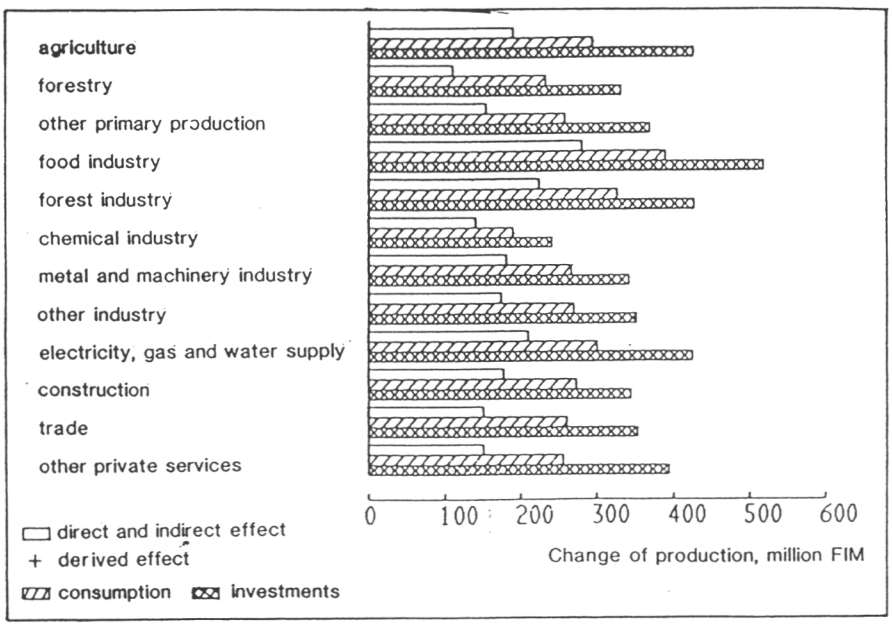


Figure 3.15 Direct, indirect and derived effects of the production for 12 sectors of the Finnish economy in 1982 (Pellervo 1986).

Acriculture, food industries, electric power and waterworks have never played a role of a major continuously expanding export sector. Agriculture and food industries, in particular, have also been substantially supported through public subventions, whereas the forest sector has been primarily operated through the free interplay of the domestic and international markets.

One principal dependent variable of economic growth in this paper has been the volume of GNP. However, reference was made to the fact that during 1880-1980 there was also a rapid annual growth of 2.3 % in real GNP per capita in Finland (Hirvonen and Hjerppe 1984). Favourable effects of functional and regional income distribution were also recorded (Section 32). In spite of the fact that a continuously strong expansion of forest sector production has taken place, there have been no fatal adverse environmental effects comparable to the present deforestation in the developing world (section 33). Although water pollution by forest industries became rather serious during the 1960's, this has since lessened as a result of corrective investments.

4. PROSPECTS FOR DEVELOPING COUNTRIES

41. General development prospects

Developing countries vary a great deal in relation to size, demography, economy, politics and culture. In 1984 about 3.4 billion people or 3/4 of the world total population lived in the Third World. The respective average annual growth in population is projected to be 1,8 % during 1984-2000, which would be 25 % less than the figure for 1965-1973. Africa would face the highest population increase (3.3-3.4 %), while Asia in general (1.6-1.4 %) and China in particular (1.0-0.9 %) are expecting a drastic slow-down in future population growth. The respective projections for industrial market economies are 0.5-0.4 %, and for non-market industrial economies 0.7-0.6 %. Such demographic factors provide one differentiating feature between the developing and the developed world. (Annex 3, Table A1; World Bank 1985.)

The developing countries's share of the total world GNP (excluding non-market industrial economies) was 21 % in 1980, which is diametrically opposite to the demographic situation shown above. The average real annual growth in GNP per capita in different country groups was as follows:

	1963-73	1973-80	1980-84
Developing countries, total	4.1	3.3	0.5
Developing countries, Africa	1.3	0.0	-2.1
Industrial market economies	3.7	2.1	1.4

The average level of GNP per capita in the developing countries was USD 660, and in the industrial market economies USD 10 480 in 1980. (Annex 3, Table A2; The World Bank 1985.)

OECD has classified 66 countries, accounting for nearly half of the total population of all developing countries, as "low income countries". Among them, the 37 "least developed countries" had an average GNP per capita of USD 280 in 1981, while the real growth rate had been -0,5 % per annum in 1971-1981. The respective figures for India and for the rest of the group were: 250, 440, and 1.5, 1.4. The gloomy future for

Africa is illustrated by the fact that 22 of the 37 'least-developed' countries are located in Sub-Saharan Africa. The variability among country achievements is notable. (Annex 4; Poats 1983.)

The average life expectancy at birth may serve as an integrated indicator of the level of living for various country groups at different levels of economic development. The respective estimates in years for males were as follows (The World Bank 1985, p. 218-219):

	China India	Other low income	Africa, sub Saharan	Lower middle income	Upper middle income	High income income oil exporters	Industrial market economies	East European nonmarket economies
1965	51	44	42	47	57	46	68	66
1983	61	50	46	55	63	57	72	66
Growth	10	6	4	8	6	11	4	0

Most health and education related indicators have shown improvements in all country groups during 1965-1982. A critical exception for sub-Saharan Africa and other low-income countries (excluding China and India) has been the daily calory intake per capita: only 91 and 93 % respectively of the requirement in 1982 were recorded as being available. One bottleneck in the economic development of developing countries has been a skewed income distribution, which has prevented the full benefits of real growth in GNP per capita from trickling down to the great masses of the poor. The available data refer to the distribution of total disposable household income accruing to percentile groups of households ranked by total household income. The distributions cover rural and urban areas and refer to different years between 1967 and 1982. The freguencies of percentage shares of such household income by the highest 10 % group of population were as follows (The World Bank 1985, 228-229):

	average (unweighted)	20-29 %	30-39 %	40-49 %	50-59 %
		number of countires			
30 developing countries	36.7 %	4	17	8	1
18 industrial market economies	24.8 %	16	2	-	-

A remarkable difference was observed in income distribution between the two groups of countries. An equal income distribution has been assumed to promote the realization of the consumption linkage (section 22). It naturally has also a direct positive effect in removing poverty. A number of authors have stressed the obstacle of skewed income distribution in economic development (e.g. Myrdal 1958; Todaro 1977; Westoby 1978; Douglas 1983).

Developing countries lost considerable market shares in the exports of primary goods to industrialized countries between 1965 and 1980. Two major factors contributing to this change were the growing processing capacity in developing countries, and the accelerating population growth of these countries. The OPEC countries took most of the respective growth. The export shares of the various country groups in 1980 were as follows (Bond 1987):

	Primary goods excl.energy	All primary goods	Manu-factured goods	Total
Developing countries	28	18	12	14
Industrial countries	69	44	86	73
OPEC	3	38	2	13
World	100	100	100	100

Developing countries did increase their share in world exports of manufactured goods from 1965 to 1980. This increase, however, was not enough to offset the decline in the exports of primary goods. (Bond 1987.) The differences in average annual changes in export volumes by country and commodity group have been substantial (Annex 5). The changes in export prices and in terms of trade have been beneficial to the group of developing countries as a whole in comparison to industrial countries, although some developing groups like African countries have also been on the losing side (Annex 6, Table A9). A feature common to all developing country groups has been a rapid growth in indebtedness (Annex 6, Table A10).

"Economic Growth in the Third World, 1850-1980" by Reynolds (1985) gives case studies for 41 developing countries with growth patterns for different epochs of transformation and occasional generalizations. Reynolds defines a situation in which population and output are growing at roughly the same rate, with no secular rise of per capita output, as 'extensive growth'. 'Intensive growth', according to him, is characterized by a sustained rise in per capita output. Seven of the 41 countries in his study seem still to be in the extensive growth era. However, the remaining countries have passed their 'turning point' into the intensive growth era as follows: the first six already during 1840-1876 (Chile, Malaysia, Thailand, Argentina, Burma, Mexico), the next 11 countries during 1880-1895, the next nine countries during 1900-1925, and the most recent eight countries during 1947-1965.

The annual growth in real GNP per capita in 1960-1980 by groups of the 41 countries were as follows: Tier (1) 4.5 %, Tier (2) 2.8 %, Tier (3) 1.6 %, and Tier (4) 0.0 %. Respective changes in food availability, primary school enrollment and in life expectancy could be observed with the exception of the lowest tier (4), where food availability had decreased 8 %. One dominating process in this economic growth has been the following type of structural transformation: the shares of agriculture out of the total output in 1980 by

tier changed from 21 % to 41 %, and those of industry from 19 % to 39 %, and the rest belonging to services (e.g. the shares in tier (1): agriculture 21, industry 39, services 40 %). This has been the consequence of a considerable decrease in the share of agricultural output and a respective increase in industrial output. (Reynolds 1985).

The annual growth in merchandise exports and the shares of exports from GDP by groups of the 41 countries were as follows (Reynolds 1985):

	Tier 1	Tier 2	Tier 3	Tier 4
Growth %, 1950-1980	10.0	9.1	7.2	5.2
Exports/GDP %, 1978-1980	24.6	18.6	10.9	11.1

Thus apparently the fastest GNP growth (Tier 1) was associated with the highest export growth and with the largest share of exports out of GDP, and vice versa. By means of regression analyses Reynolds (1985) found that the following factors best explained economic growth in 1960-1980 among the 41 countries: export growth rate, agricultural production growth rate, and the growth rate of the share of gross domestic investment in GDP. They were all positively associated with GNP growth.

Reynolds (1985, p. 413) concluded as follows: "Even though we know that growth of agricultural output, growth and diversification of exports, and a high investment rate seem to be important, the sources of sustained growth remain mysterious." As a final point he took up the role of politics and government. Strength of nationhood, degree of interest in economic growth by the governing group, administrative competence of government, and general stance of economic policy are all important aspects in promoting or hindering economic development.

This brief review of general development prospects, although the field is highly controversial, seems to leave the possibility that the theory of forest-based development

(section 2) and the findings from the case study of Finland (Section 3) may still have some relevance for present developing countries due to the essential role of exports in both cases.

42. Forest sector policy transformation

FAO policies revisited

A benchmark for the reorientation of international forest sector policies may be found in "Forest energy and economic development" by Earl (1975). Based on his review of economic growth, development and energy, Earl argued that the key to successful development in all countries is the promotion of a viable rural economy. He stressed the importance of an active human resource for the countryside in contributing a surplus of food and raw materials for towns and industry. If an active rural sector is recognized as an essential ingredient of the development process, he continued, then the part that the forest fuel resource can play becomes of prime importance. Earl concluded that fuel must be provided for the basic needs of the local population. While Westoby (1962) excluded fuelwood from his analysis of forest-based development, Earl (1975) made an original contribution about the potential roles of fuelwood and rural populations in economic development. Earl's book had no FAO connection, but it is included here owing to its assumed effects on FAO policy transformations.

Another benchmark for policy reorientation was launched by Westoby (1978), then a retired FAO officer. He stated that forest industries have made little or no contribution to economic development in the under-developed world. The arguments for priority being given to forest industries, put forward by Westoby (1962), seemed valid enough at the time and later on they successfully promoted financing for such projects. In the course of the last two decades, 100-150 million hectars of tropical forest became contracted to industry for harvesting. Accordingly, the removals of

tropical hardwood logs quadrupled between 1950 and 1976, while log exports rose from 3 to 49 million m^3. As a parallel, the proportion of logs removed from the forest that were processed in the source countries declined.

Westoby (1978, p. 7) continued his critical evaluation of the past by presenting that, although every under-developed country now has a forest service, nearly all of these services are woefully understaffed, and miserably underpaid. "Because they exist, exploitation is facilitated; because they are weak, exploitation is not controlled. Because exploitation has been uncontrolled, and management nonexistent, marginal farmers, shifting cultivators, and landless poor have followed in the wake of the loggers, completing the forest destruction. Of the original moist forest area, over half has disappeared in Africa, over one third in Latin America, and over two fifths in Asia. And the tropical forests continue to shrink (Sommer 1976)." Westoby referred to Sommer (1976) concerning deforestation rates.

Westoby (1978, p. 8) argued further that, due to the concentration of development efforts on industrial activities, the supporting of agriculture and raising rural welfare have been either badly neglected or completely ignored. He pointed out that the real problem lies in the fact that, in many of the under-developed countries, neither government nor officialdom display any great enthusiasm for mitigating the lot of their poorer people. The interests of the two groups are diametrically opposed "That is why the demand for a' new economic order', with its attendant scenario of poor nations versus rich nations, is the biggest, brightest and most convenient red herring yet devised."

Westoby (1978) was supported by Leslie (1980), a former chief of the FAO Forest Industries Division, who observed that only a few areas in the developing world have been identified for which a positive general economic development can be explained to any marked degree by forest-based economic development. Myrdal (1968) had already presented the idea of a power elite operating in a 'soft state' which resembled the

above description by Westoby. Later, Reynolds (1985) strongly emphasized that government matters in economic growth, especially the strength of nationhood, continuity of political leadership, degree of interest by the governing group, administrative competence and general stance of economic policy (section 41 above).

FAO forest sector policies, in the meanwhile, began to change from the primary policy (section 11 and above) along with growing environmental pressure and a transformation in the World Bank's line (section 11). The first assessment of tropical deforestation was executed (Sommer 1976). A start was made on studying watershed management, upstream conservation and conservation in arid and semi-arid zones, and guidelines published. Studies on local community development were also executed. Ultimately a new policy became formulated as "Forestry for rural communities" (FAO 1979). It contained the main theme that forest and forestry have an important role to play in preventing the further neglect of the rural poor.

FAO's (1979, 1980) new policy stated that forestry for community development must reflect the needs, problems and aspirations of local people from their own perspective. Accordingly, to be appropriate its strategy should vary by community and place. Community forestry underlines social, rather than strictly commercial needs. It also means that agriculture and forestry have to become better integrated than hitherto. A shift to community forestry was considered not particularly a technical problem, but rather a psychological, institutional and political one. The new policy was based on a growing appreciation that full development of a country's human and material resources is not possible without mobilizing the rural poor. Community forestry was assumed to consist of fuelwood production, production of wood for local artisans and craftsmen, tree farming for commercial pulpwood, production of nonwood cashcrops, such as bamboo, mushrooms, nuts and pine kernels, food and forage through agroforestry and environmental

forestry to protect agriculture and increase its productivity.

An integrated policy outline was later presented by FAO (1983b) under the heading "Forestry for development." As a logical consequence of the policy transformations described above, FAO reformulated its integrated approach to promoting development as follows: "The forest of the tropics possess the potential to make a major contribution to development meeting the basic needs of the rural poor, sustaining industries which provide employment and income, and maintaining the environmental stability needed for the continuing production of food. But if this potential is to be realized, uncontrolled exploitation of the forest must be replaced by management of the entire forest resource." (FAO 1983b, p. 3.)

Douglas' (1983) "A reappraisal of forestry development in developing countries" appeared as a post scriptum to these policy changes. He strongly criticized Westoby's (1962) original contribution, pointing out that Westoby excluded totally fuelwood, his linkage effects were doubtful; higher income elasticities of demand for forest products and the proposed leading position of forest sector in the economy similarly became questioned. Douglas took up income distribution as a critical issue in transforming economic growth into economic development. He followed the staple theorists (section 22) and Myrdal (1958), but made no reference to them. Douglas observed a strong connection between technology and income distribution. Technology appropriate to local conditions should therefore be chosen.

Douglas (1983) described the basic needs approach to development. It grew out of the observation that, in some developing countries highly concentrated and unequal growth prevailed for long, periods with little indication of a spreading of the growth effect. The basic needs strategy involves essentially a minimum level of welfare below which individuals should not be permitted to fall. Six basic need areas are identified as follows: nutrition, education,

health, sanitation, water supply and housing (cf. section 13: the concept of level of living). Douglas introduced environment, fuelwood, agro-forestry and rural development as principal components for forest sector development. He excluded commercial industrial activity from this set, and even proposed disinvestments for existing large-scale pulp and paper mills. Douglas had gained his personal experience and most empirical material in Bangladesh, which may partly explain his pessimistic attitude towards the development potentials of forest sectors.

The international integrated policy approach

Subsequently, FAO started to follow some other international agencies (e.g. UNIDO) in a pursuit to improve methods of economic analyses in evaluating economic net benefits of publicly supported development projects. A guide on "Economic analysis of forestry projects" (Gregersen and Contreras 1979) was published. This undertaking can be considered as a bottom-up approach in transforming forest sector policies. Common policy objectives for evaluation purposes were listed as follows: economic efficiency, a decrease in the gap between the rich and poor, environment and land use as well as government revenues.

Gregersen and Contreras (1979, Sup. 1) also provided case studies in order to illustrate the rather demanding methodology of the economic analysis of forestry projects. Such cases consisted of a Philippine smallholder tree-farming project, village fuelwood plantations in Korea, a South American natural forest utilization project, two Kenyan sawlog and pulpwood plantation projects and a Zambian industrial forestry project. Additional readings given in the paper covered agricultural and rural development projects, the distributional consequences of forestry projects, and watershed projects (ibid., Sup. 2). Accordingly, "Economic analysis of forestry projects" did advance, not only the important methodology of economic project analysis, but also an integrated approach to forest sector policy formulation.

Somewhat later, an International Task Force was established by the World Resources Institute, The World Bank, and the United Nations Development Programme (UNDP) in order to prepare a program needed to combat tropical deforestation. Accordingly, the formulation of the program was based primarily on the high costs of tropical deforestation. The report takes the positive attitude that tropical deforestation can be arrested through a massive investment action of USD 8 billion for 1987-1991. If a half of this financing, as recommended, would be mobilized by the development assistant agencies and international lending institutions, this would mean an investment of USD 800 million a year, which would double the present level of external aid in this area. (International ... 1985, p. 1-2.)

The International Task Force adopted five priority areas for action from the concurrent "Tropical Forestry Action Plan" drawn up by FAO (1985). In descending order of proposed investment outlays, these priority areas consisted of fuelwood & agroforestry, forest management for industrial uses, land-use on upland watersheds, conservation of tropical forest ecosystems, and strengthening institutions for research, training and extension. A detailed description of each priority area was executed in the form of case studies (International... 1985, Part II). The arguments behind the program for "forest management for industrial uses" did not have any Westobian reasoning, but simple ideas to import substitution and exporting opportunities (International ... 1985, Part I, p. 30-33). The program focuses on three major types of activity: protection and management of natural forests, more intensive use of existing resources, particularly lesser-known species, and accelerated industrial reforestation.

"Tropical forest: A call for action" report (International ... 1985) identified 56 high-priority countries with national investment proposals (Part III). Special attention was paid to identifying small-scale projects with a potential for widespread replicability and to their success in involving local people.

The "Tropical forestry action plan" by FAO (1985) was prepared concurrently with the above "Tropical forest: A call for action" report. The two reports are coordinated concerning the priority areas, and are complementary but also duplicatory to each other. The FAO priority areas were: (1) forestry in land use, (2) forest-based industrial development, (3) fuelwood and energy, (4) conservation of tropical forest ecosystems, and (5) institutions. The five proposals were endorsed by The Committee on Forest Development in the Tropics, which is composed of 45 member countries. The proposals, it was argued, should be considered as an overall conceptual framework for action in the field of tropical forestry.

The FAO (1985) action plan states that a forest without industry is essentially of no financial value to a government, although its social and environmental value may be considerable. The introduction of forest-based industrial activities provides social benefits, one of which is income both to the government and to the local people. The establishment of forest industries provides centres for rural development, potential foreign exchange earnings, and an improvement in the value added by exporting processed wood products instead of roundwood. Substantial new demands for industrial forest products in developing countries were also assumed. However, no essential interindustry substance of the earlier Westobian approach of the forest industries' role in the attack on underdevelopment remained.

The World Conference on Agrarian Reform in 1979 mobilized the idea of a comprehensive rural development approach. The new concept was launched to refer to diversification of rural economic activities, including integrated crop-livestock development, fisheries and aquaculture and integrated forestry development. The two action plans for the tropical forest sector (International ... 1985; FAO 1985) are examples of a wide-scale application of this new policy concept which, later on, was also called an integrated rural development policy. FAO in its own organizational framework has the best

capacity to promote more comprehensive intersectoral policy applications.

Later on an integrated 'Tropical Forestry Action Plan' has been created by FAO, The World Bank and other relevant international organizations (FAO 1987a).

National policy renewal

Forest sector policy transformation was reviewed in the above from an international point of view. The international agencies are no doubt in a key position to influence developing countries, either indirectly through policy recommendations in the meetings of country representatives of such agencies, or directly through development projects in the respective countries. Quite a number of such projects under the title "A Forest Policy Development Project" or its variations have taken place, usually with commonly FAO as an executive and UNDP as a financing body, and to an increasing extent recently also through national aid agencies.

The present author has worked as an information system consultant for FAO in four developing countries, namely in Malaysia, The Philippines, Mozambique and Nigeria. The author was impressed with the up-to-date forest sector policy formulations in those countries. They had keenly followed the above transformation (Palo 1975, 1978, 1980; Palo and Olojede 1982). Just about every developing country with any considerable forest area has nowadays a national forest service (Westoby 1978). It is assumed here that most of them today have a rather up-to-date forest policy formulation which takes into account economic, social and environmental, tangible and nontangible benefits accruing from a forest sector to local and national communities. "Social forestry became fashionable after Jakarta (The VIII World Forestry Congress in 1978). Governments began to rate it as a higher priority in assistance requests." (Pardo 1985, p. 736.)

A few country cases are introduced in order to illustrate the renewal of national forest sector policies. An optimistic

analysis of the competitiveness of the Nigerian forest sector in international markets was conducted by Adeyoju (1975). Multiple purpose policy statements existing already at the beginning of the 1970's in the Federal Republic of Nigeria consisted of reserving adequate areas for permanent forests to obtain a maximum sustained timber yield, to increase sectoral revenue and to ensure full employment, the savanna forest should be managed both for wood production and grazing, establish plantations for fuel and for poles, and to maintain efficient forest services (ibid. p. 46). In a many-sided description of the benefits of forestry and forest industries the author (ibid. p. 194) observed, in addition to value added and employment, the standard 'minor products' and wildlife also 'agri-silviculture' or a 'tayngya' system, prevention of erosion, protection of water catchment, farmland protection by shelter belts, provision of roads, special crops and ancillary services.

Sahu (1986) made a parallel evaluation of the economic, social, and environmental importance of the forest sector in the state of Orissa, one of the twenty-two federating units in the Union of India. He analysed the contribution of forestry and forest industries to income and employment, to government revenue, the role of forests in tribal and rural development and an appraisal of the state forest policy.

"A review of policies affecting the sustainable development of forest lands in Indonesia" was recently prepared jointly by the Department of Forestry/Government of Indonesia and The International Institute for Environment and Development (Government of Indonesia ... 1985). The review was intended to provide a basis for restructuring Indonesian government policies. First, references were made to the multiple importance of forest resources on the one hand, and to strong deforestation on the other hand.

The principal contention of the review was that the sustainable use of forest lands should be a central pillar of Government policy. Accordingly, there must be close coordination of all the Government's general and sector

Government policy. Accordingly, there must be close coordination of all the Government's general and sector policies which affect forest resources. A strategy for sustainable development of forest resources was considered to contain such issues as:

- Department of Forestry: Prevent further degrading of forest lands. Rehabilitate degraded lands. Enhance productivity of forest. Promote employment opportunities. Develop research and other supporting activities.

- Department of the Interior: Convene a multisectoral conference on land-use planning. Prepare new land-use maps in cooperation with other agencies. Promote the involvement of local communities in small-scale industries for timber and minor forest products.

- Ministry of Information: Promote a national information campaign to save Indonesia's remaining forests.

- Ministry of Trade: Renew efforts to promote domestic trade in forest products and for the export and marketing of plywood. Discourage an increase in large-scale forest industries.

- Ministry of Population, Environment and Development: Stabilise the population as soon as possible. Encourage the movement of population from critical watersheds. Stimulate and monitor environmental aspects of all the above activities.

- Additional issues were vested in the departments of Public Works and Transmigration, and the ministries of Institutional Reform, Industry, and Communication.

Further illustrative country cases are available in various sources (e.g. Kumar 1986).

Reservations on policy transformation

Past transformations of forest sector policies at the international and national levels, as expressed in printed documents, were described in this section. The emphasis was focused on the coverage and objectives of such policies. Means and implementations of policies remained outside the scope of this section. The shortcomings in effectiveness, and other capabilities of the forestry administrations of

41. Successful development can still be based on export-oriented strategies (section 41). Forest policies have within a decade become transformed, at least as expressed in official documents, in order to support forest-based

ERRATA! Please note that the following three lines are missing from the top of page 101:
developing countries, have been widely criticized and are well know. They most likely also play a major role in the realization of economic development as introduced in section

Developed and developing countries

The revised theory of forest-based development (chapter 2) appeared fruitful in explaining long-range economic development in Finland according to the pilot case study above (chapter 3).

The most remarkable benefits to Finland in mobilizing her economic development through the forest sector towards the end of the 19th century was the way in which the international markets functioned and the small scale of the technology prevailing in those early days. The world the developing countries are facing today is in both respects remarkably different. It has been widely discussed that structural differences under the present global economic system may lead to asymmetric exchange relations, and to the domination of a weaker party by a stronger one. The United Nations' Conference on Trade and Development (UNCTAD) was established during the early 1970's to renew and control these relations (Westoby 1978; Douglas 1983). On the other hand, it has been argued that, due to ecological constraints (e.g. climate, poor and erosion-sensitive soils, and animal and human health hazards), the development threshold is higher in the tropical countries than in the temperature zone countries when they entered the industrial stage (Kamarck 1976). A number of other differences between the two groups of countries have been identified (e.g. Leslie 1968).

The international trade between developing and developed countries was previously characterized by the export of primary products by the former, and the export of processed goods by the latter. The past structure of trade has recently become profoundly transformed (section 41 above). An access to exportable staple goods provided the principal basis for international specialization, and later on to industrialization, for most of the present developed countries during their preindustrial development stages. A large number of present developing countries seem to be following a similar path (section 41 above).

The revised theory of forest-based development (chapter 2) seems to have maintained its relevance according to the general achievements of developing countries in economic development (section 41 above) and to the transformations of forest sector policies since the 1960's (section 42 above). The key role of income distribution was already apparent to the early staple theorists of the 1950's and the 1960's. The pattern of distribution is an essential element of the consumption and agricultural linkages (Figures 2.1, 3.8, 3.10). Fuelwood, food and protection services by forestry to agriculture were already identified in the agricultural linkage of a forest sector (Figures 2.1 and 3.10).

The comprehensive theory of forest-based development (chapter 2) facilitates the understanding of past positive development (if any) and the missing linkages behind a trapped development. To a certain degree it can be empirically tested, e.g. the rate of forest product exports, the share of roundwood out of total exports (a high share hinders development), diversity of internal linkages within the forest sector, the role of fuelwood in the consumption by farmers and other groups of people, etc. However, the lack and poor quality of input-output tables is one weakness in such an analysis.

The international trade in forest products is still dominated by developed countries, but some developing countries, such as Malaysia, Indonesia, Brazil, The Republic of Korea and

Singapore have been progressing in exports (Figures 4.1-4.4). The imports of forest products have grown faster than the respective exports in most of the developing countries. The value of forest product imports was double the value of respective exports in 1957-1959, but nearly 15 times in 1983-1985 in all developing countries. The value of exports at the end of the period was 1.7 times the initial value, while that of imports was 11.9 times the respective initial value. (Westoby 1962; FAO 1986b.)

The developing countries have experienced industrialization between 1950 and 1980: production of sawnwood grew at an annual rate of nearly two percent, veneer and plywood by seven percent and pulp and paper by about five percent. However, although developing countries possess half of the world's forest resources, they have a share of only 20 % in the manufacture of forest products - and most of it in the slower growing sawmilling sector. A real obstacle for development has been the long prevalence of logs in the total exports of forest products (Figure 4.5; FAO 1983b). It has effectively hindered the respective further industrialization through various linkage effects.

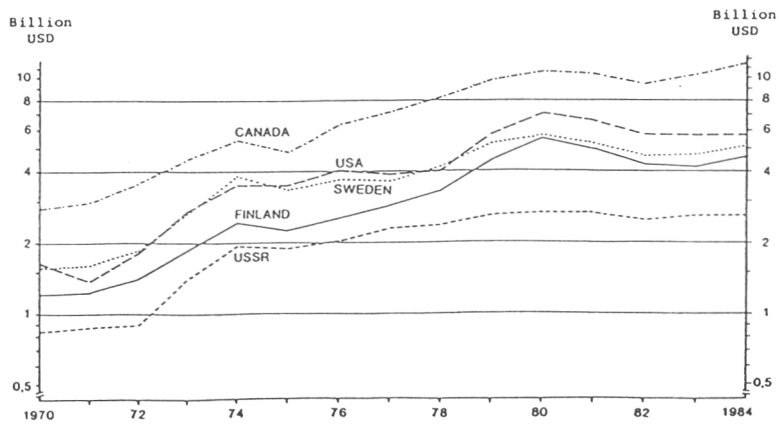


Figure 4.1 Total value of the exports of forest products, billions of US dollars: 1970 - 1984, semi-logaritmical scale (source: FAO 1985).

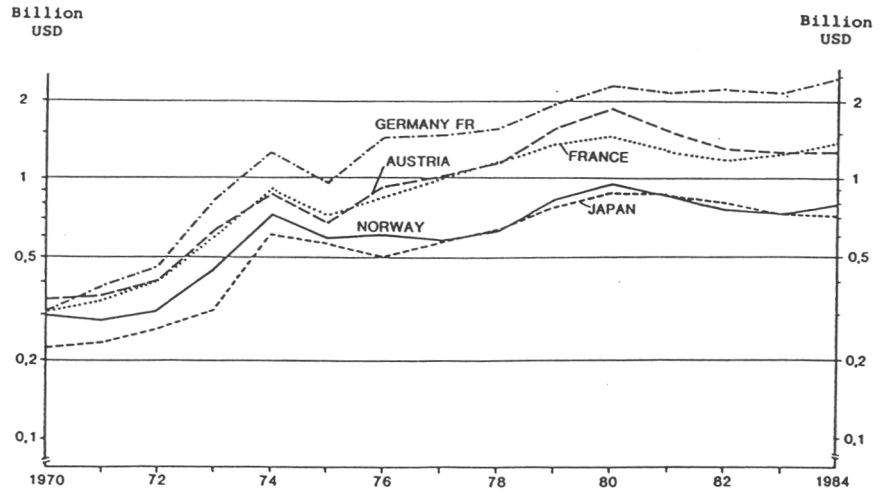


Figure 4.2 Total value of the exports of forest products, billions of US dollars: 1970 - 1984, semi-logaritmical scale (source: FAO 1985).

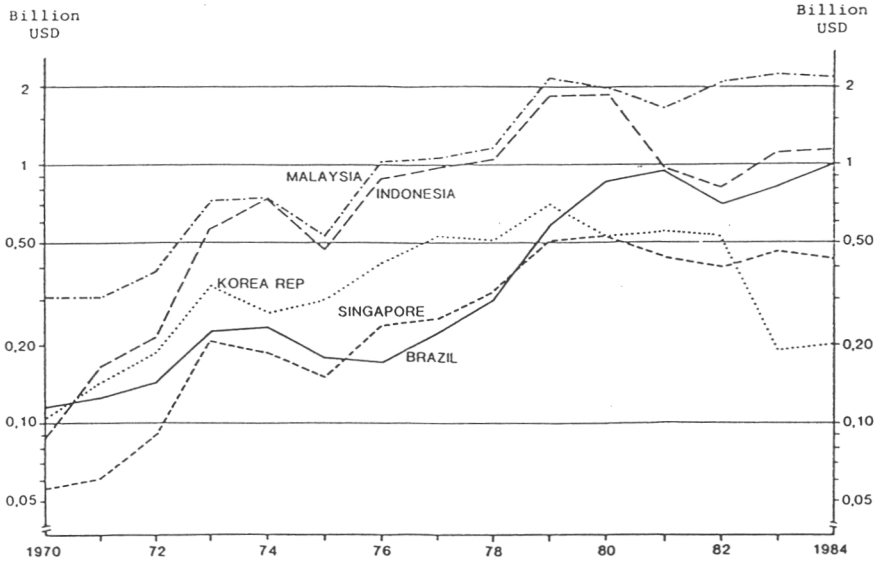


Figure 4.3 Total value of the exports of forest products, billions of US dollars: 1970 - 1984, semi-logaritmical scale (source: FAO 1985).

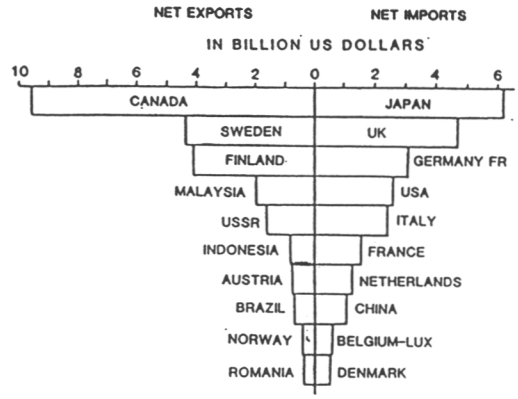


Figure 4.4 Net exports and imports of forest products in order of magnitude by countries in 1980 - 1984 (source: FAO).

The developing countries where the value of forest product exports exceeded the value of respective imports in 1979-1980 consisted of the following groups (divided by continents):

a) Latin America: Bolivia, Brazil, Chile, Honduras and Paraguay.

b) Africa: Cameroon, Central African Republic, Congo, Gabon, Ghana, Ivory Coast, Liberia, Mozambique, Swaziland and Zaire.

c) Asia and the Pacific: Burma, Indonesia, Malaysia, Papua New Guinea and the Philippines.

Forest-based development prospects will be further analysed among these countries in the next subsection. The conclusion is based on the fact that, in order to be able to play an important role in development, the forest sector should have comparative advantages as indicated by being a positive net exporter. Some exceptions may exist, but they can not be traced in this pilot paper. In the following no statistically justifiable testing procedure can be applied, but only a pilot, visual description about the potential development effect of forest sector exports.

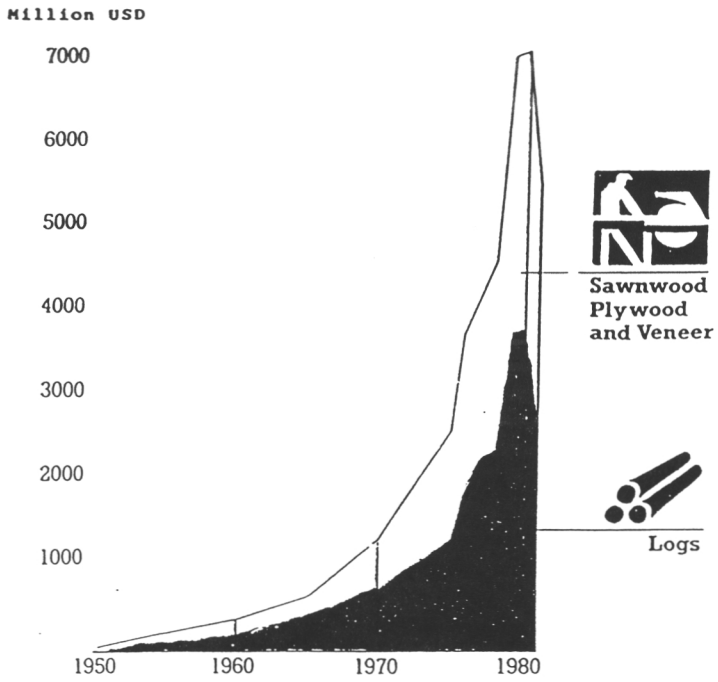


Figure 4.5 Export of major tropical wood products (FAO 1983b).

Latin America

In the past optimistic prospects for forest-based development in Latin America have been presented (e.g. Gregory 1965). The real achievements of the continent seem to carry a paradox: on the one hand success stories of the establishment of forest plantations and pulp mills are widely known, but on the other the overall national records remain rather poor. Mery (1987) concluded: "while these countries hold approximately one fifth of the world's forest area and they have more hectares of forest per capita than the countries of other continents, their forest have played a limited role in their economic growth during the past few decades. In 1980

the imports of forest products reached USD 2 500 million while the exports were only USD 1 600 million."

As pointed out above, only in five out of 27 Latin American countries did the value of forest products exports exceed the value of respective imports in 1979-1980. Furthermore, even in the respective five countries the share of forest products out of the value of total exports remained low during 1965-1985: in the cases of Brazil, Honduras, Chile and Bolivia under 20 % and in the case of Paraguay between 10-30 % (Figures 4.6 - 4.7). Thus both export-led and import-substituting economic growth based on a forest sector seem to have remained limited. In fact, no Latin American country has fulfilled the theoretical requirement of a prevalence of forest products in total exports as an avenue to a forest sector-led industrialization and economic growth, as was the case with Finland (section 22, chapter 3 above).

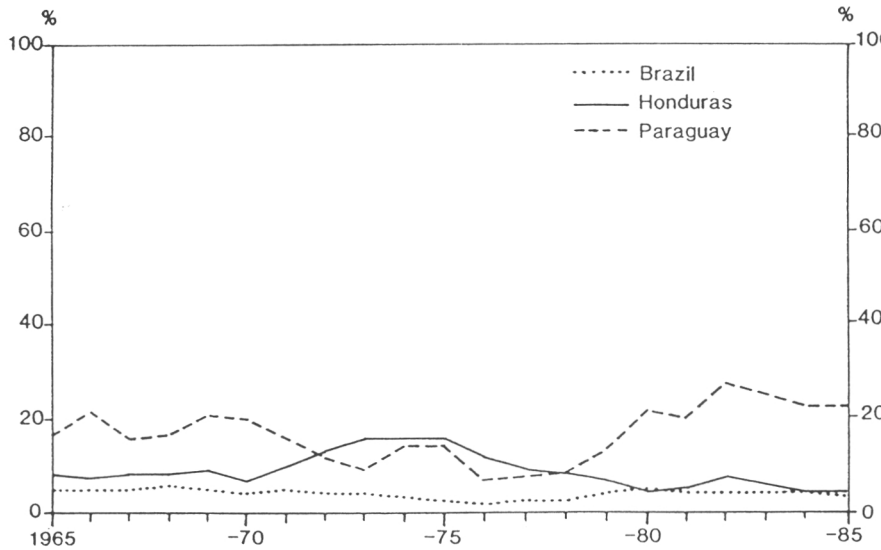


Figure 4.6 Forest products exports of total exports (%) in Brazil, Honduras and Paraguay (sources: FAO Yearbooks of forest products & United Nations Yearbooks of international statistics; same sources in Figures 4.7 - 4.22).

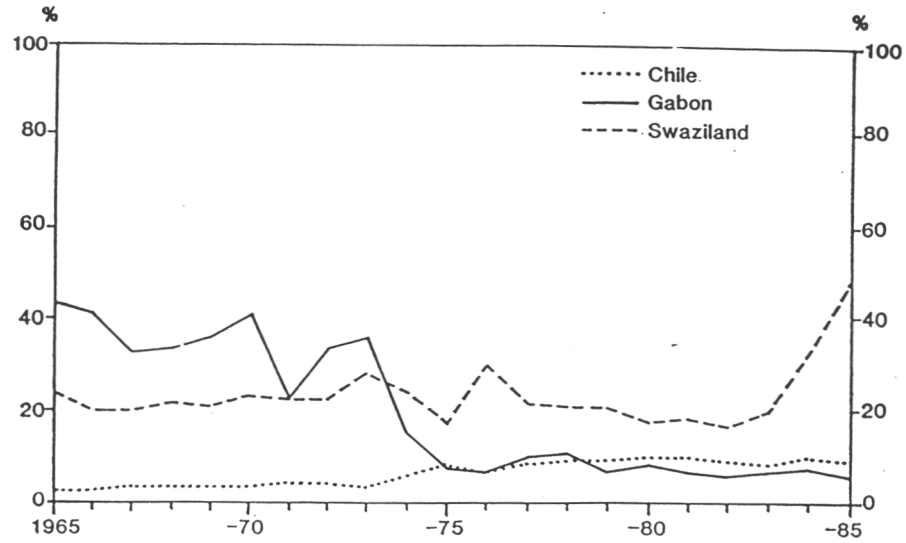


Figure 4.7 Forest products exports of total exports (%) in Chile, Gabon and Swaziland.

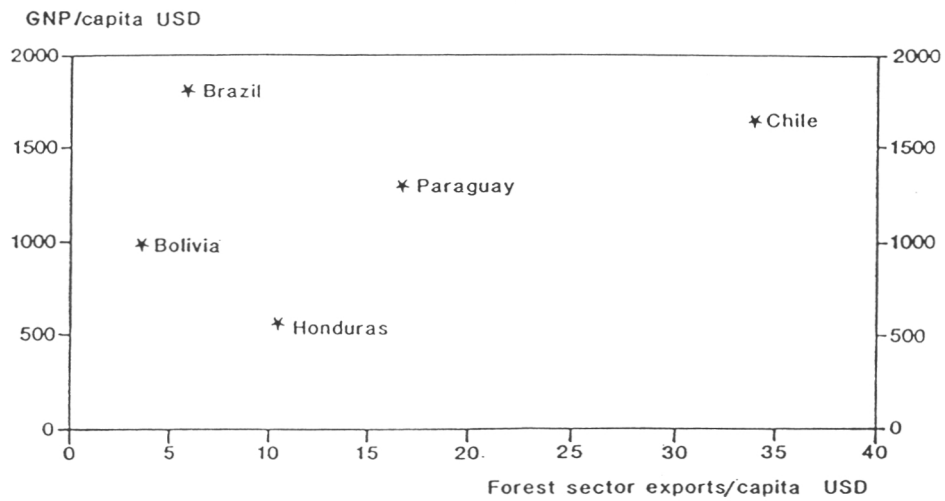


Figure 4.8 Value of forest sector exports per capita and GNP per capita in 1980 in Brasil, Bolivia, Chile, Honduras and Paraguay.

In a cross-sectional visual description of the five countries, no correlation could be observed between the value of forest sector exports per capita and GDP per capita (Figure 4.8). The underlying hypothesis here is that a strong positive correlation would indicate the possibility of the positive contribution made by the forest sector to economic growth. A description of the same variables as the time series for Chile, Paraguay and Brazil gave a better impression of the possibility of such a contribution (Figures 4.9 - 4.11). Chile was the best case in this respect. She was also introduced as a model country of forest-based industrialization recently by The International Task Force (1985). Brazil, on the other hand, has the most successful recent exports in the forest sector (Figure 4.3) and a number of promising implemented projects of forest plantations and pulp mills.

The outlook of forest products consumption from 1984 up to the year 2000 in Latin America indicates rather fast growth rates: 3.7 times the actual level of 1984 for wood-based panels, 2.3 times for paper and paperboard and 1.9 times for sawnwood (FAO 1986a). Only domestic sawnwood production is expected to match such an expansion in consumption.

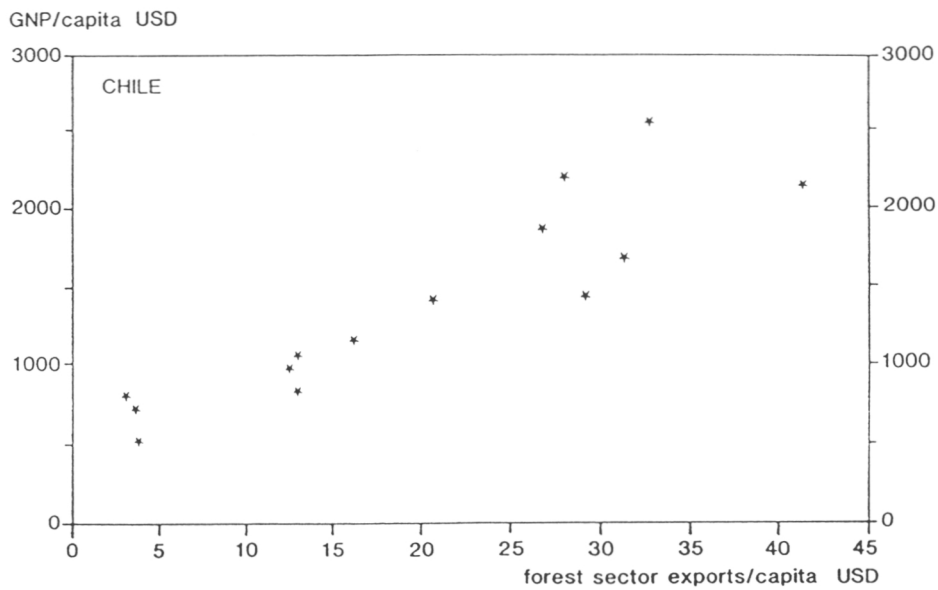


Figure 4.9 Forest sector exports per capita and GNP per capita in Chile in 1965 - 1985.

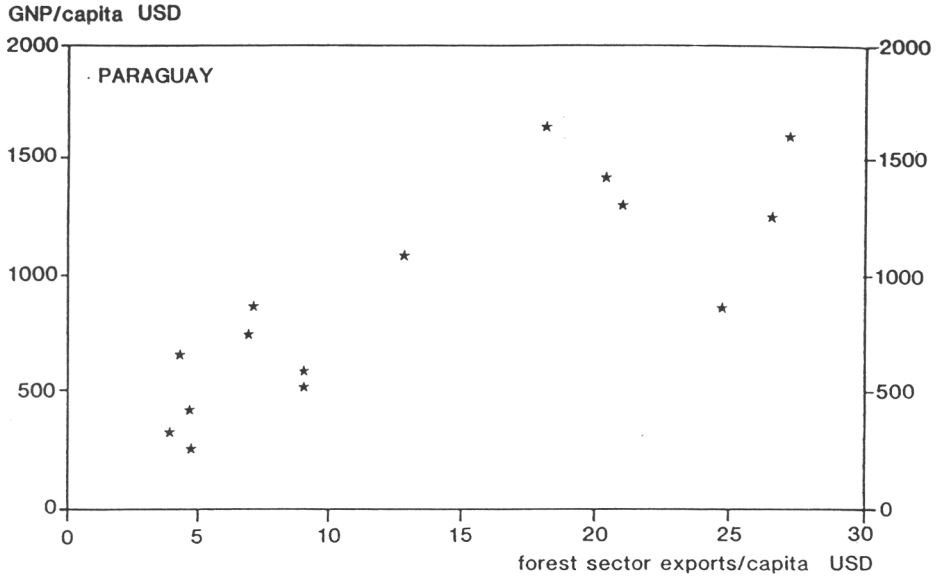


Figure 4.10 Forest sector exports per capita and GNP per capita in Paraguay in 1965 - 1985.

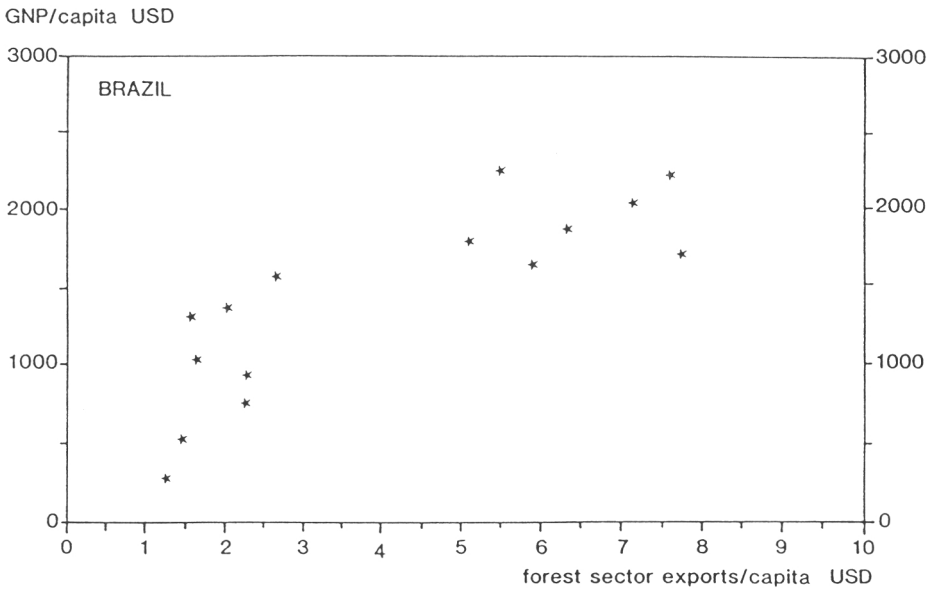


Figure 4.11 Forest sector exports per capita and GNP per capita in Brazil in 1965 - 1985.

Africa, Asia and the Pacific

The developing countries of Africa, Asia and the Pacific region have, to some extent, achieved better forest-based development than the Latin American countries. In 1980 the region as a whole exported forest products with a value of USD 7 124 million, and imported respective products with a value of USD 6 378 million (FAO 1986b). In 15 out of 89 countries the value of forest sector exports exceeded the value of the respective imports in 1979-1980 (FAO 1986b). Four out of five leading developing country exporters have been Asian countries (Figure 4.3). Many drawbacks in forest-based development have been apparent also in this part of the Third World. One weakness in comparison to Latin America has been that the pulp and paper subsector has been less developed.

In 23 African countries with forest predominantly of the moist tropical type, the value of forest sector exports was only 6 % of the value of total non-petroleum exports in 1980 (Adams 1985). The total log production in tropical Africa has been growing, while the share of exports (in roundwood equivalents) has been declining and the share of processed products out of total exports has decreased from 27 to 21 % during 1966-1980 (Figure 4.12).

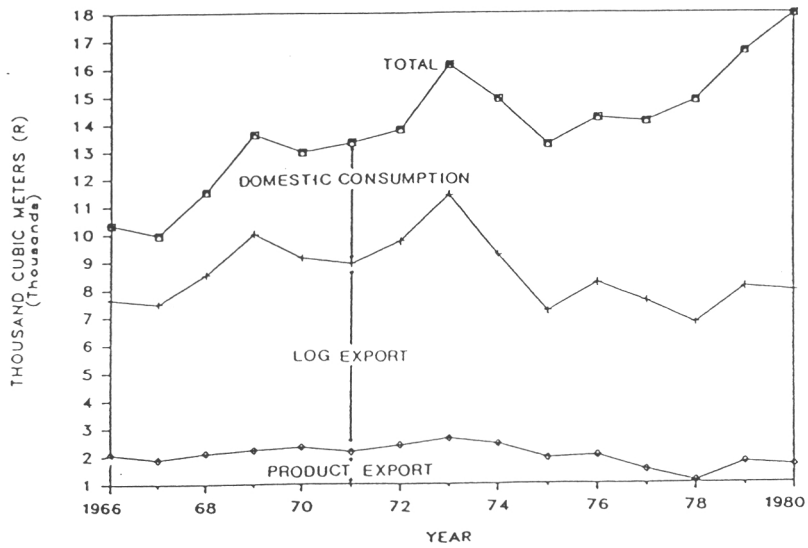


Figure 4.12 Tropical African log production and its disposition (Adams 1985).

Among the leading exporting countries in Africa the share of the forest sector out of total exports is higher than in Latin America, but in most cases remained under 50 % during 1965-1985 (Figures 4.7 and 4.13). The Congo had a higher share between 1968 and 1972, but since then her forest sector exports have been declining. Also Gabon's achievement up until 1973 was promising, but has since then become depressed (Figure 4.7). The Central African Republic and Swaziland are the only African countries with higher shares of forest sector exports and with somewhat growing trends (Figures 4.7 and 4.13). The shares of forest sector exports out of the value of total exports in the four leading net exporters in Asia and the Pacific are have remained under 30 %, and been rather stable or declining (Figure 4.14). During 1965-1985 no African, Asian or Pacific country has fulfilled the theoretical requirement of a predominance of forest products in total exports as an avenue to a forest sector-led industrialization and economic growth, as was the case of Finland (section 22, chapter 3 above).

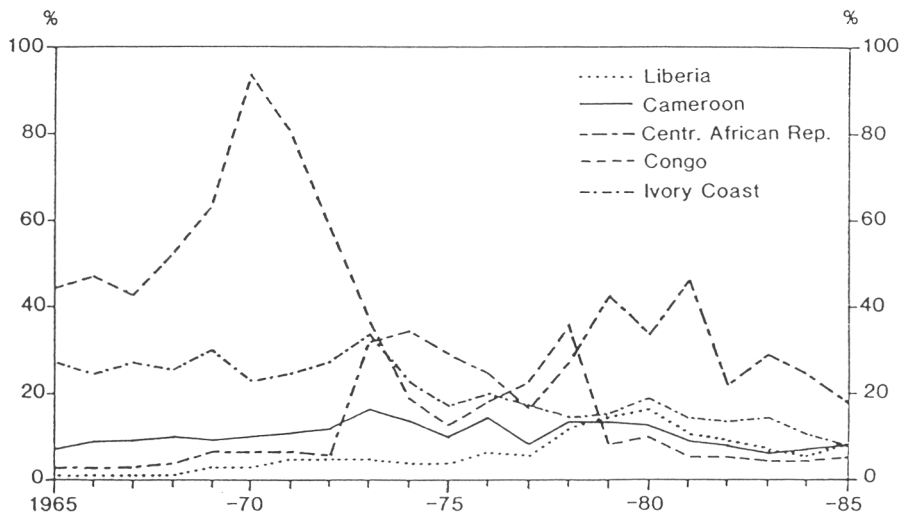


Figure 4.13 Forest products exports of total exports (%) in Cameroon, Central African Republic, Congo, Ivory Coast and Liberia.

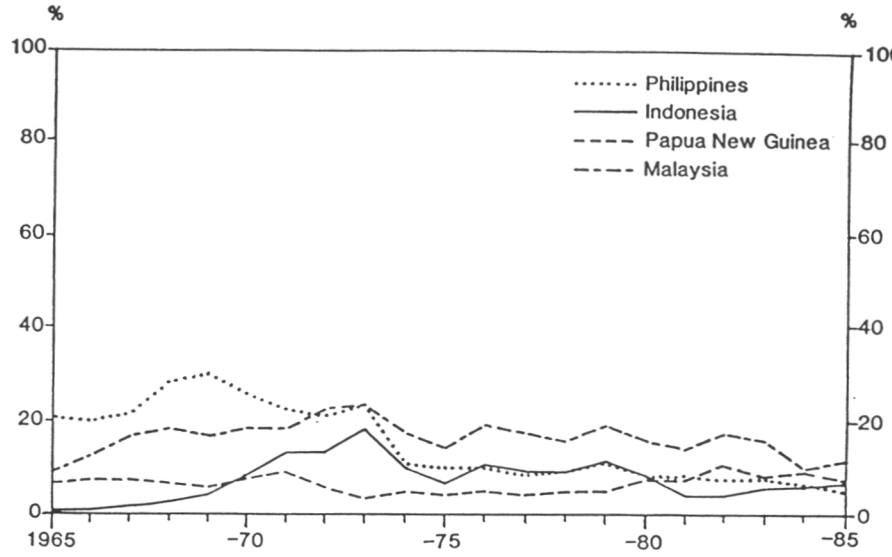


Figure 4.14 Forest products exports of total exports in Indonesia, Malaysia, Papua New Guinea and Philippines.

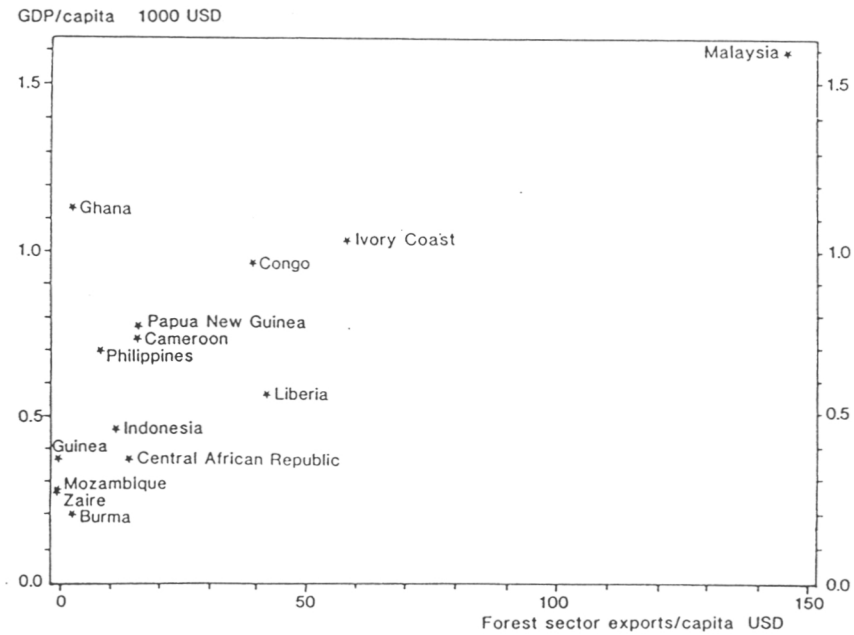


Figure 4.15 Forest sector exports per capita and GDP per capita in 1979 - 1980 for 14 net exporting countries in forest sector in Africa, Asia and Pacific.

A visual description of the value of forest sector exports per capita and GDP per capita as a cross-sectional analysis of 1979-1980 was made for 14 net exporting countries in the forest sector in Africa, Asia and the Pacific (Figure 4.15). Some positive correlation appeared. The respective time-series for Swaziland, Malaysia and Indonesia (Figures 4.16-4.18) supported this finding, while those for Gabon, the Congo, Ivory Coast and the Philippines (Figures 4.19 - 4.22) did not support the correlation found in the cross-sectional description. The possibility that exports have considerably supported economic growth in a few countries of the whole region forest sector remains valid.

The outlook for the consumption of forest products from 1984 up to the year 2000 in Africa, Asia and the Pacific indicates rather similar fast rates of growth as those for Latin America (FAO 1986a). The prospects for future self-sufficiency in forest products remain lower in the former region compared to the latter: the projected production in 2000 as a percentage of the respective consumption in the whole former region was 86 % for panel products, 77 % for sawnwood and only 47 % for paper and paperboard (FAO 1986a).

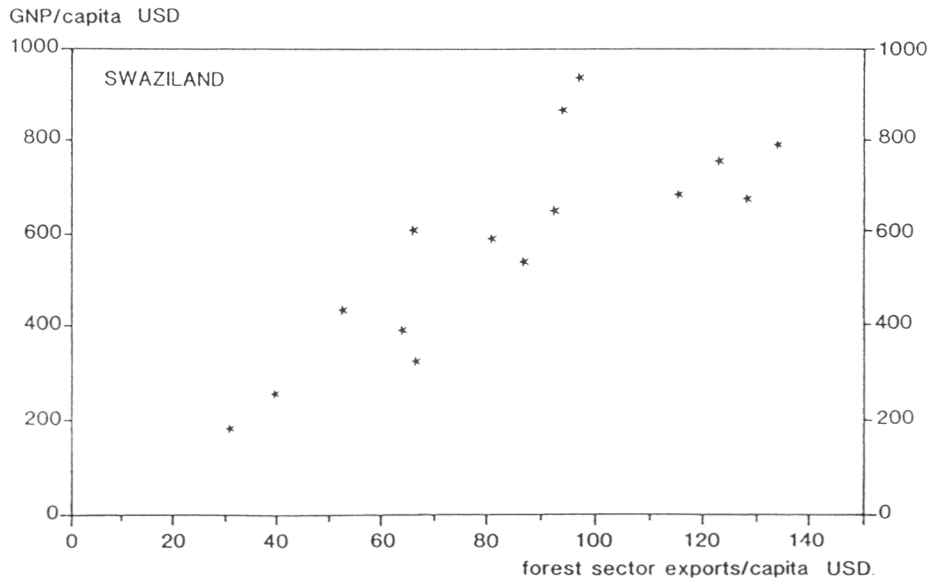


Figure 4.16 Forest sector exports per capita and GNP per capita in Swaziland in 1965 - 1985.

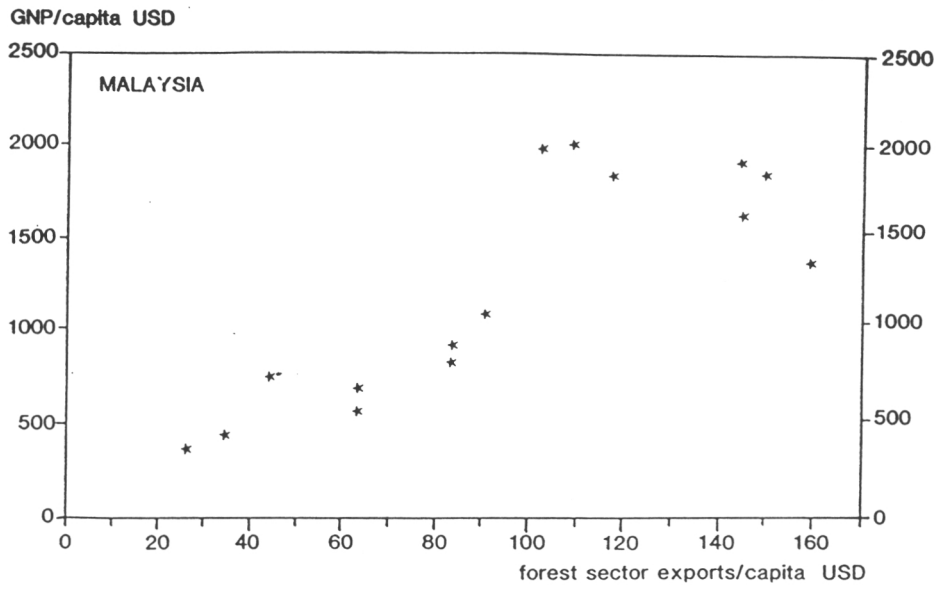


Figure 4.17 Forest sector exports per capita and GNP per capita in Malaysia in 1965 - 1985.

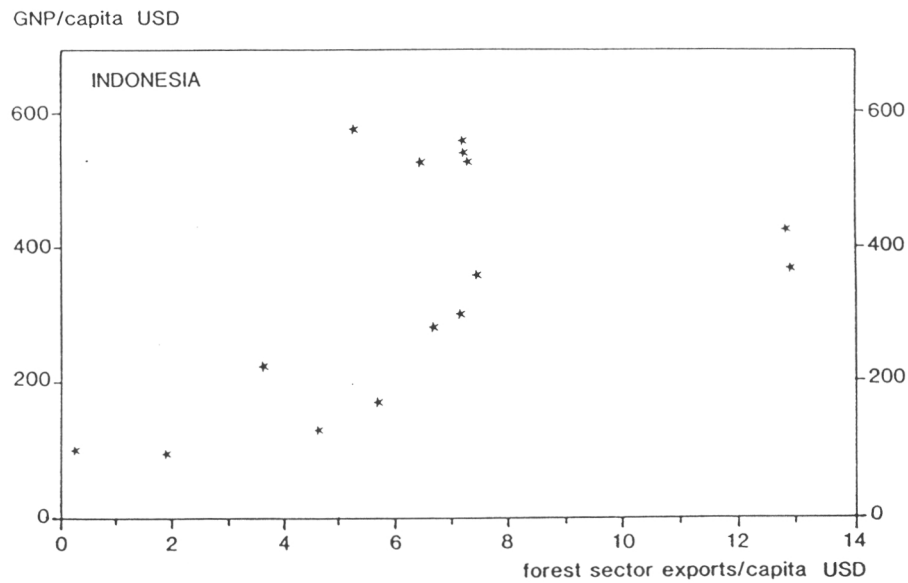


Figure 4.18 Forest sector exports per capita and GNP per capita in Indonesia in 1965 - 1985.

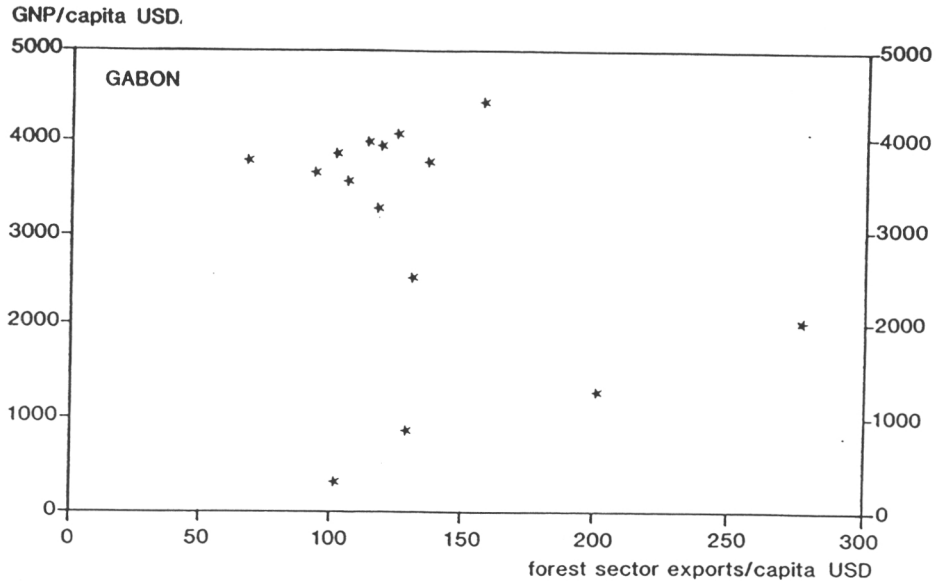


Figure 4.19 Forest sector exports per capita and GNP per capita in Gabon in 1965 - 1985.

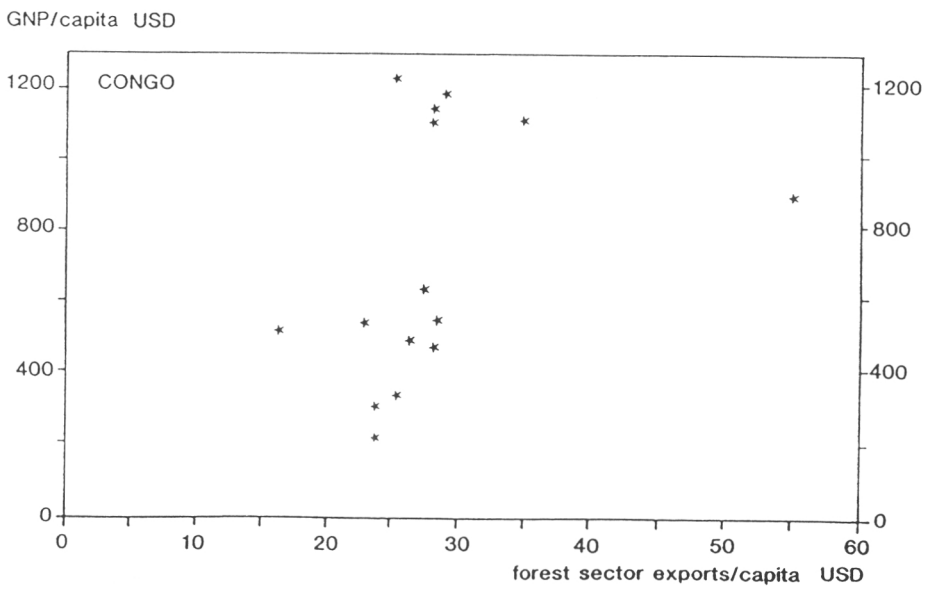


Figure 4.20 Forest sector exports per capita and GNP per capita in Congo in 1965 - 1985.

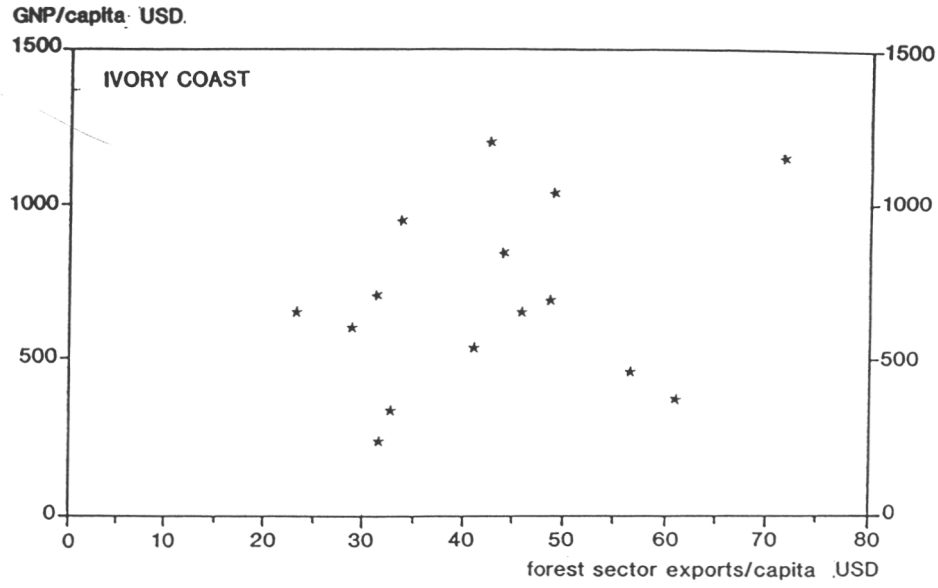


Figure 4.21 Forest sector exports per capita and GNP per capita in Ivory Coast in 1965 - 1985.

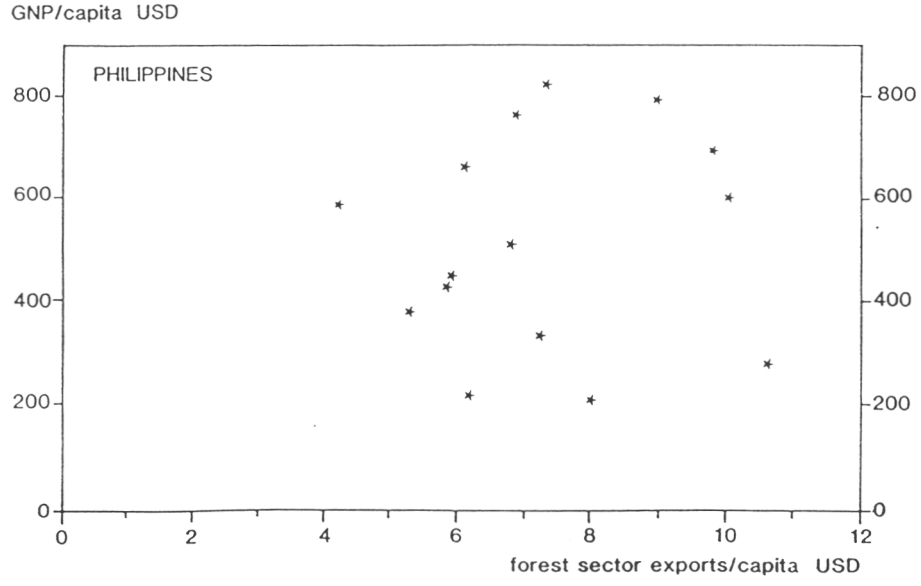


Figure 4.22 Forest sector exports per capita and GNP per capita in Philippines in 1965 - 1985.

44. Deforestation and other reservations for development

Whether the potential contribution made by forest sector exports to economic growth has been transformed into development (see definition in section 13) depends on distributional aspects and on various adverse effects such as deforestation. The sad feature of the present deforestation situation is that the apparent threat of it taking place along with an expansion of industrial logging in developing countries was anticipated already at the end of the 1950's (FAO 1958). Deforestation prospects are gloomy (Palo 1987; Palo, Mery & Salmi 1987a & b). The causal relationship between deforestation and industrial logging has been either belittled (e.g. Lanly 1982), or pointed out as an established fact (e.g. Westoby 1978, World Bank 1978).

Industrial logging promotes deforestation partly directly, through careless log extraction and road construction, but mainly indirectly by opening up access into previously inaccessible forests. No quantitative estimation of this phenomenon is available, and it would appear to be problematic. The most relevant measure, the annual expansion of the forest road network, does not exist as a statistical variable in the countries concerned.

An experiment was carried out in order to explain the deforestation phenomenon separately in the above two groups of countries. Forest coverage was applied as a negative "proxy" for deforested areas and was the dependent variable. Specification of the following models was done according to the practice of Palo, Mery and Salmi (1987a, Section 22, Annex 5). The population variables were removed in order to clarify the roles of the more direct variables. Also some other variables from the model of Annex 5 (ibid) were omitted in order to avoid multicollinearity. The following models were first estimated for the 20 countries where forest sector exports are dominating (1) and then for the 19 countries where forest sector imports were dominating (2).

(1) $FC = 89.490 - 0.0684\ FF - 0.529\ AG - 8.790\ FW - 7.596\ IW + 0.00209\ GN$
$\quad\quad\quad\quad (6.275)\quad (0.0469)\quad\quad (0.155)\quad\quad (5.223)\quad\quad (8.414)\quad\quad (0.00259)$

Adjusted R^2 = 0.64
F-statistics = 7.83

where,

FC = forest coverage (%)
FF = share of forest fallow (%),
AG = agricultural area coverage[1] (%),
FW = relative fuelwood production (m^3/ha),
IW = relative industrial wood production (m^3/ha),
GN = GNP per capita (USD 1980).

The figures in parentheses are standard errors of the coefficients. Most of the signs are negative and thus agree with the hypotheses. The sign for GN contradicts the hypothesis, and the coefficient is not statistically significant (at 10 % risk). The coefficient for IW has a 'proper' sign but is not significant.

(2) $FC = 98.317 - 0.175\ FF - 1.067\ AG - 0.430\ FW + 3.460\ IW - 0.00381\ GN$
$\quad\quad\quad\quad (7.254)\quad (0.049)\quad\quad (0.130)\quad\quad (0.478)\quad\quad (10.502)\quad\quad (0.00314)$

Adjusted R^2 = 0.86
F-statistics = 23.63

See (1) for symbols.

The signs of the coefficients are in agreement with the hypotheses with the exception of IW, the coefficient of which has no statistical significance (neither the coefficients of FW and GN). Model (2) has a higher degree of determination and a higher F-value than model (1), and is thus superior to

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[1]AG has some degree of defitional correlation with FC but, due to such other coverages as urban, infrastructural and waste lands, it does not bias the results.

it. The first three independent variables have all negative signs in both models, but the signs of the last two independent variables are opposite in the two cases. The two models did not give any statistical support to the hypothesis that industrial logging would play a direct role in deforestation. Otherwise they tend to support (with the exception of GN) the ex ante hypotheses, particularly so in imports dominating countries (model 2).

Independently of the direct role of industrial logging in deforestation, the process itself and subsequent erosion has been expanding to a conciderable extent simultaneously with industrial logging and especially through clearing for agriculture and shifting cultivation (cf. models 1 and 2) in the Third World. Furthermore, tropical and subtropical deforestation will increasingly be a serious threat to the future industrial log supply, and also otherwise produce serious social costs and rural depression (Palo, Mery & Salmi 1987b). The mechanisms for decelerating or controlling deforestation are, unfortunately, weakly developed in the Third World and thus the chances of halting deforestation are regarded as low (Palo & Salmi 1987). This situation contrasts diametrically with the renewal of Finland's forests along with her forest-based development (section 33).

There was no developing country in section 43 with forest sector exports holding a dominating share in total exports for a longer period. This was considered to be a theoretical prerequisite for full mobilization of forest-based development (section 22), as has been the case in Finland (Figure 1.1). The share of logs in total exports of forest sector products (Figure 4.5) has also remained at too high a level to permit proper diversification of domestic forest industries (Figure 3.4) or the realization of the forward linkages of forestry in most of the Third World countries. Thoburn (1977, p. 77) referred to the same fact in his statement concerning East Malaysia: "timber exporting on the present scale is essentially of a 'vent-for-surplus' nature offering no basis for future development once the stock is exhausted...".

While Finland has enjoyed a high level of domestic ownership of the production factors in her forest sector (section 33), the conditions in a large number of developing countries have been different in this respect. Although forest ownership has remained primarily in domestic hands, large concessions with favourable terms have frequently been handed over to expatriates. Foreign capital and labor have also been rather common in developing countries (Contreras 1987). Such a situation has handicapped proper development in cases where the repatriation of incomes has taken place on a sufficiently large scale.

Distributional aspects were considered important in mobilizing consumer linkages already by the early staple theorists (section 22). In the case study of Finland (section 32) their role, especially in the form of forest ownership by farmers, became evident for the agricultural linkage (Figures 2.1, 3.8 and 3.10). Low wage levels and predominantly public ownership of forests have prevented or had a decelerating effect on the proper formation of consumer and agricultural linkages in the Third World. The lack of stumpage income for farmers has omitted one key form of financing agricultural development.

The unfavourable location of many of the developing countries in relation to the fast growing markets of the industrialized countries has been one more restriction on forest-based development by increasing transportation costs and slowing down the diffusion of innovations. Another major problem to overcome has been the high mixture of tree species. The problem has become emphasized through the weak national research and development system which have been symptomatic for the Third World. The low degree of domestic R & D has also deteriorated the chances for emergences of various backward and investment linkages in situations where appropriate technologies have not been readily available from industrialized countries.

Asymmetric international relationships between developed and developing countries have been one of the most advertised reservations for trapped development. Reynols (1985) investigated economic growth in 41 developing countries during 1850-1980. He did not find any support for the general assumption that asymmetric relationships are a major hindrance for development. Scandizzo and Diakosawas (1987) explored the basic problem of the secular trend of the terms of trade of primary commodities. They found "no basis to believe that a general deterioration has occurred in the welfare position of developing countries because of a declining trend in relative prices of primary commodities" (ibid p. 159). They found the trade of primary commodities to be comparatively instable, but, for the long term, they were not able to show that instability had been increasing over time. However, no timber commodities were included in their study.

Another asymmetric relationship occurs in foreign dependence of forest sector investments. The transnational ownership of forest industries and logging concessions is considerably wide in Africa, Asia and the Pacific where it is mostly export-oriented, whereas in Latin America the transnationals have concentrated in pulp and paper and are oriented towards domestic markets (Annex 10). Indications exist that host countries have not received a fair share of the income generated by transnational operations. Transnational corporations may also inhibit the development of domestic entrepreneurship. Transnationals have often been reluctant to increase the degree of domestic processing; and "they often operate as technical and economic enclaves in the host country with few links to the rest of economy, and therefore with few-multiplier effects". (Contreras 1987.)

5. DISCUSSION

51. Remarks on the revised theory

In this paper the theory of forest-based development was revised, a pilot case study of Finland executed and the prospects for developing countries reviewed on the basis of this theory and available data. The framework and empirical applications extend over such a wide field that the results and conclusions can only have an interim character. However, being a part of a larger research project "Deforestation and development perspectives in developing countries" (Palo, Mery and Salmi 1987b), this study was a necessary step in furthering understanding of deforestation and development in the Third World.

The tradiotional theory of forest-based development, as formulated by Westoby (1962, 1969) was revised on the basis of the staples and linkages theories. Although Westoby's early contribution was strongly criticized later on, for instance, by Westoby himself (1978) and by Douglas (1983), the main ideas of Westoby's (1962, 1969) framework appear to be functional in the light of this study. Westoby clearly underestimated in the 1960's the role of the agricultural linkage of the forest sector, while neglecting the analysis of fuelwood and the key role of functional income distribution. The latter aspects he strongly stressed later on (Westoby 1978, 1985).

A vital forest sector policy transformation (Section 42) took place mainly during the 1970's. Along with income distribution and rural development (agricultural linkage) issues, environmental effects and dependencies were strongly emphasized. The likelihood of increasing deforestation along with expanding industrial logging in the Third World was anticipated early enough (FAO 1958). Westoby (1962, 1969) did not identify deforestation as a specific risk. Instead, he clearly pointed out the various 'non-crop' utilities of forests or forest influences and stated that they were inseparable from forestry planning. Sartorius and Henle

(1968) most clearly brought up the deforestation aspect in the policy discussions.

Westoby (1962, 1969) quite correctly emphasized the potentials of the backward and forward linkages of forest industries. He considered wood as a versatile raw material that provides a potential for diversified forest industries. However, he did not recognize the final demand linkages like consumption and investments linkages which most likely have played a major role in the forest-based development of Finland (section 32).

Forest-based development theory as revised in this paper is difficult to verify or falsify with empirical evidence (Leslie 1968, 1971). A broad subject field and a long time for the various effects to mature are the two major reasons for such a situation. Doubts have also been raised about whether the same theoretical framework could be applied for both developed and developing countries. However, increasing experience has accumulated for the successful analysis of the two groups of countries within the same frame of reference (Baldwin 1963; Thoburn 1977; Reynolds 1985; Hwa 1986; Syrquin 1986; Williamson 1986).

52. Remarks on Finland

The pilot case study of Finland covered the years 1860-1982. The time series was certainly long enough for the various effects of the forest sector to become mature. Some relevant time series were lacking, as was especially the case with older input-output studies that have been helpful in identifying the development of the various linkages. The various hypotheses and reservations of the revised theory of forest-based development were preliminarily tested by analysing such statistical data and the economic history.

Stressing the strategic role of the forest sector's agricultural linkage in economic development fits well with the recent findings and arguments about agricultural-demand-

led industrialization (e.g. Adelman 1984; Hetemäki 1986; Mellor 1986). This strategy consists of building a domestic mass-consumption market by improving the productivity of agriculture and letting farmers share the fruits of the improved productivity. The strategy focuses primarily on improving the productivity of small- and medium-scale agriculture rather than of large-scale agriculture. The former has a larger marginal propensity to consume and invest in domestically produced goods than the latter. The strategy tends to promote effectively agricultural expansion-induced domestic industrialization.

Accordingly, it seems most likely that a forest-based development in an institutional environment similar to Finland, where a private small- and medium-scale ownership of joint forestry and agricultural production has been dominating, rests on two driving forces: export-led expansion of forest products production and, as induced through the various linkages of the forest sector, agricultural-demand-led industrialization. This finding is thought to be a novel contribution of this paper to development economics.

How Finland has been able to overcome the various theory reservations and development traps was also described. Particularly worth mentioning is the fact that a strong deforestation threat during the latter part of the last century was eliminated through an active forest policy and flexible operations of the market mechanisms under favourable natural conditions with a low-risk for erosion.

Accordingly, the hypothesis that the forest sector was the key factor in mobilizing and maintaining Finland's economic growth and other economic development since the middle of the last century could be sustained. In this respect Finland may hold a unique position in economic development among the nations of the world (Annex 9). Since the forest sector is no longer Finland's dominant export sector, the country's future economic growth and development can no longer be predicted by the theory of forest-based development. Instead, this theory still helps us to understand the mechanisms of the economic

development effects of the forest sector and can, in this respect, benefit the planning and control of forest policy and general economic policy.

A major scientific and statistical effort to describe quantitatively the growth and structural change of the Finnish economy during 1860 - 1985 was completed quite recently (Hjerppe 1988). This paper has relied heavily on the time series produced by that growth study of 13 volumes. However, the growth study was based more on a Harrod-Domar-type of framework for economic growth than on a more staples- and linkage-oriented approach of this paper. Accordingly, the growth study, althougt it gave the key statistical data of the forest sector's role in economic development, did not identify its most important role as a driving force behind this long-range economic development in Finland.

Hjerppe (1988, p. 149) identified the period of 1870 - 1875 as a mobilizer of exports expansion in Finland. The share of exports from the total demand was then 20 %, and the annual growth of the exports was 5.6 %. The respective figures for forest products exports were as follows: sawnwood +109 %, pulp and paper +30 % and roundwood & tar +14 %. Quite clearly forest products were the engine for the growth of exports during that critical period and also later on for most of the time.

Hjerppe also described the potential benefits of large-scale exports to a small country (ibid, p. 137-140, 148-149). She assumed that the repercussions of expanding sawnwood exports were large due to the patterns of forest ownership and employment as well as due to the domestic financing of mills and their operations. She found also a favourable development in terms of external trade (ibid, p. 137-140, 150), and the key role of domestic agriculture and consumption as well as consumption induced linkages. Hjerppe concluded (ibid, p. 167) that Finland had, in general, followed the average pattern of structural change in a number of Western European countries with certain modifications due to the central role

that forest industries have had in Finland's economic development. These latter findings by Hjerppe are in agreement with the present paper.

Raumolin (1984) described the effects of the forest sector on the long-range economic development in Finland. He concluded that the forest sector had played the most important role as a driving force of the development, thus his major findings were in full agreement with this paper. Raumolin applied a rather implicit approach of staples and linkages, while in this paper an integrated, explicit framework was created to promote relevant uses of empirical data. Raumolin comitted himself primarily in verbal description and his paper concerned only Finland.

Kiljunen (1985) analysed profoundly the various factors of long range economic development in Finland. He stressed overcoming the core-periphery relationship under which Finland initiated her development. Kiljunen pointed out in an interesting way how Finland was in the periphery in comparison with Western Europe but in the core in comparison with tsarist Russia and Soviet Union. The latter relationship provided protected markets for Finnish processed goods and thus nursed previous home market industries further to face the more competitive Western markets. However, Kiljunen did not stress the key role of forest sector in Finnish economic development, although he analysed widely the prospects of LDC competition on Finnish forest products exports.

53. Remarks on developing countries

Analysis of the prospects for developing countries remained at a rather preliminary stage. Further case studies are required and, in fact, have been initiated (Palo, Mery, and Salmi 1987b) to complement the picture gained in this study. The development prospects of the Third World look paradoxical: on the one hand the achievements in general economic development for a great number of countries seem promising (section 41; Reynolds 1985; World Bank 1985), while on the other hand only a few countries were identified where

forest-based economic development could be observed on a scale that might have had sustained net effects on the general economic development. Even in these cases there are considerable deforestation threats.

The revised theory of forest-based development served well its function to guide observation also in developing countries. The share of forest sector exports out of total exports was found, as a rule, to be too low for full mobilization of forest sector-led development according to the theoretical requirement and the case of Finland. The role of logs in relation to more processed products had also remained too strong in most of the Third World countries to facilitate a proper diversification of domestic forest industries. Foreign concession of forests, capital and labor have also hampered proper development through the repatriation of incomes and foreign dependency (Contreras 1987).

The role of income and wealth distribution on development has been frequently emphasized (Myrdal 1958; Watkins 1963; World Bank 1978; Westoby 1978; Douglas 1983; Hetemäki 1986). It was also a key element in the agricultural and consumption linkages of the revised theory. Apparently low wage levels and the predominantly public ownership of forests have hampered the proper formation of these linkages. The lack of stumpage income for farmers has meant that one key form of financing agricultural development has been, according to the case of Finland, omitted.

54. Conclusions

The expansion and diversification of the Finnish forest sector was described. This development was especially promoted by the increasing demand for forest products and increasing supply of domestic roundwood, as well as by the versatility of wood as a raw material (forestry's forward linkages). During the hundred-year period from 1880 to 1980 the exports of the Finnish forest sector correlated

positively and strongly with economic growth. This simple association was interpreted partly as a direct and partly as an indirect contribution by the forest sector to economic growth. The effects of backward, investment and consumption linkages were assessed for twelve sectors of the Finnish economy in 1982 based on an input-output study (Pellervo 1986). Among these sectors, the forest industries had the second largest linkage effects after food processing. For a long period forestry has contributed nearly half of the net farm capital income and, accordingly, it has been a key financer of agricultural investments. Thus a joint long-range expansion of forestry and agriculture has contributed favourably to economic development.

Only a few areas in the developing world where a positive general economic development can be explained by forest-based economic development have been identified. Consequently, the serious consequences of uncontrolled logging, followed by shifting cultivation, and of other uncontrolled use and clearance of forests frequently occur. Deforestation and the consequent erosion jointly initiate a form of antidevelopment process that is rarely touched on in the numerous publications on economic development.

Deforestation is presently advancing at the fastest rate in the developing countries. It hence has an accelerating nature and is threating the sustained resource base of the forest industries. It has to be considered simultaneously along with an application of a development theory (Palo & Salmi 1987). Deforestation has also been a real threat to present developed countries when they were undergoing similar economic conditions, but it has, in most cases, become stabilized under an industrial economy. A new threat, however, has recently appeared in the form of air pollution and other related factors. Deforestation in developing countries is even more serious than in industrial countries due to the fact that the conditions are more sensitive to erosion. (Dasgupta 1982; Palo 1987; Palo, Mery & Salmi 1987a & b).

The past transformation of forest-based development strategies has been strong (section 42). Still, on the basis of this paper, the recommended options for the countries of the Third World seem to be inadequate in some key respects. The distributional aspects should get more priority. This includes, for instance, reconsidering of forest ownership patterns, especiallly in connection of new forest plantations and of implementing effective land reforms (Salmi 1988). Various agro-forestry actions have recently been in a high fashion. They belong to the same distributional category of policy means. On the other hand, faith should be re-established in export-led development based on the expansion of forest products under effective distributional mechanisms and forest policies.

Future forest-based development strategies should be tailored according to the different planning situations faced by developing countries of varying sizes, locations, periods, resources, degrees of past development, cultures and other characteristics. However, socially unacceptable excess deforestation is one common threat for most developing countries. An effective control of deforestation would rely more on a free play of roundwood and product markets as well as on more integrated strategies of forestry, agriculture, infrastructure and demography sectors. Even the ongoing Tropical Forestry Action Plan (FAO 1987a) by FAO and other agencies seems inadequate to decelerate effectively deforestation. The next reports of the present research project will deal in more detail with the inherent proposals for changes in forest-based development strategies.

The strategies on forest-industries should be reshaped in order to promote development in The Third World. The adverse effects of transnational ownership has to be eliminated (Contreras 1987). The fresh campain to promote small scale forest sector technology and entrepreneurship (FAO 1987b) has to be continued and strengthened. The major strategies of export-orientation and import substitution have to be consired in due circumstances. Effective appropriate

economic, social, forest and environmental policies have to be created and coordinated.

Forest and forestry have traditionally had a low image as propellers of development in various parts of the world. On the contrary, forests often have been viewed as hindrances for development. Clearance of forests for agricultural or for nearly any other purpose but forestry has had a positive connotation in people's minds. The role of this fact cannot be underestimated. If proper forest-based development under sustainable forest resources is sincerely desired, a radical change in the attitudes in this respect by the mass media, the public at large and the political leaders is required. The identification of the essential causal mechanisms in deforestation and in forest-based development as well as alternative future scenarios may be effective tool to change the attitudes and the behavior of the respective people.

The present research project on deforestation and forest-based development in the Third World is going on according to the exposed plan (Palo, Mery & Salmi 1987b). Next, comparative analyses on deforestation and development in Chile and Finland will be executed. The comparison will be based on the respective, tentative theoretical frameworks as outlined here and in the previous report (Palo 1987). Finland will serve in this comparison, as in the other future case studies, as a base-line country where it has been shown that deforestation has been succesfully prevented and real forest-based development has taken place. Some other recent comparative country analyses have also shown Finland's achievements in these fronts in a positive light, but they have lacked coherent theoretical frameworks (Raumolin & Seppälä 1985; Banuri & Apffel-Marqlin 1988).

The Global Trade Model of forest products as originally developed by The International Institute of Systems Analysis (IIASA) could be applied in some case studies to promote analysing of future prospects (Kallio et al. 1987). In future analysis of developing countries more profound tools in order to separate the effects of various sectors are needed:

econometric models (e.g. Kumar 1986) on one hand and general equilibrium models for development (e.g. Dervis et al. 1984) on the other hand. Especially the effects of income distribution require multisectoral planning models.

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Annex 1a. Direct, indirect and derived effects of the 100 million FIM increase in demand for final products. Input-output tables of the Finnish economy in 1982 (Pellervo 1986, p. 147).

Sector	Increase in production, million FIM		
	Direct and indirect effect	+ derived effects	
		Consumption	Investments
1. Agriculture	191	293	423
2. Forestry	110	232	330
3. Fishery	127	243	363
4. Ore mining	159	246	345
5. Other mining	173	276	387
6. Food	280	388	516
7. Beverages and tobacco	194	285	370
8. Textiles and clothing	146	227	292
9. Leather products and shoes	163	245	315
10. Lumber	200	310	408
11. Non-metallic furnitures	180	281	365
12. Pulp, paper and paper products	232	331	431
13. Printing and published products	203	312	406
14. Chemical products	178	252	323
15. Petroleum products	108	129	157
16. Rubber and plastic products	153	238	307
17. Pottery, glass and stone products	173	268	348
18. Metals	234	306	387
19. Metal products and machinery	173	265	342
20. Electrical machinery and instruments	145	232	301
21. Transport equipment	169	249	318
22. Miscellaneous manufactured products	152	243	316
23. Electricity, gas and heat supply	212	300	424
24. Water treatment and supply	152	265	379
25. House construction	180	275	346
26. Land and water construction	172	265	336
27. Trade	152	261	353
28. Nourishment and accommodation	190	286	379
29. Transport and storing	150	238	333
30. Post and telecommunications	134	251	357
31. Financing and insurance	140	254	349
32. Housing	139	254	552
33. Services for real estate and business sectors	165	274	383
34. Public and private services	140	249	339

Annex 1b. Effects of the 100 million FIM increase in demand for forestry final products. Input-output tables of the Finnish economy in 1982 (Pellervo 1986, p. 150).

Sector	Increase in production, million FIM		
	Direct and indirect effect	+ derived effects	
		Consumption	Investments
1. Agriculture	-	10	13
2. Forestry	101	102	103
3. Fishery	-	-	1
4. Ore mining	-	-	-
5. Other mining	-	-	-
6. Food	-	18	23
7. Beverages and tobacco	-	2	2
8. Textiles and clothing	-	2	3
9. Leather products and shoes	-	1	1
10. Lumber	-	1	2
11. Non-metallic furnitures	-	1	1
12. Pulp, paper and paper products	-	3	4
13. Printing and published products	-	4	6
14. Chemical products	1	3	4
15. Petroleum products	1	5	8
16. Rubber and plastic products	-	1	1
17. Pottery, glass and stone products	-	1	3
18. Metals	-	1	5
19. Metal products and machinery	1	3	13
20. Electrical machinery and instruments	-	1	4
21. Transport equipment	-	1	4
22. Miscellaneous manufactured products	-	-	-
23. Electricity, gas and heat supply	-	7	11
24. Water treatment and supply	-	-	-
25. House construction	-	1	17
26. Land and water construction	1	1	9
27. Trade	2	17	26
28. Nourishment and accommodation	-	6	8
29. Transport and storing	1	9	14
30. Post and telecommunications	-	3	4
31. Financing and insurance	-	2	4
32. Housing	-	14	18
33. Services for real estate and business sectors	-	5	8
34. Public and private services	1	7	10
Total (1-34)	110	232	330

Annex 1c. Effects of the 100 million FIM increase in demand for final products of forest industry. Input-output tables of the Finnish economy in 1982 (Pellervo 1986, p. 151).

Sector	Increase in production, million FIM		
	Direct and indirect effect	+ derived effects	
		Consumption	Investments
1. Agriculture	-	8	11
2. Forestry	25	27	28
3. Fishery	-	-	1
4. Ore mining	-	-	1
5. Other mining	-	1	1
6. Food	1	15	21
7. Beverages and tobacco	-	1	2
8. Textiles and clothing	-	2	3
9. Leather products and shoes	-	-	1
10. Lumber	33	33	35
11. Non-metallic furnitures	-	1	1
12. Pulp, paper and paper products	104	106	107
13. Printing and published products	-	5	6
14. Chemical products	5	7	8
15. Petroleum products	4	7	9
16. Rubber and plastic products	1	1	2
17. Pottery, glass and stone products	1	2	4
18. Metals	2	3	6
19. Metal products and machinery	4	6	19
20. Electrical machinery and instruments	1	2	5
21. Transport equipment	-	1	5
22. Miscellaneous manufactured products	-	-	-
23. Electricity, gas and heat supply	25	30	34
24. Water treatment and supply	-	-	-
25. House construction	1	2	17
26. Land and water construction	1	1	6
27. Trade	3	16	24
28. Nourishment and accommodation	1	6	8
29. Transport and storing	7	13	18
30. Post and telecommunications	1	3	4
31. Financing and insurance	1	3	4
32. Housing	-	12	16
33. Services for real estate and business sectors	2	5	9
34. Public and private services	1	7	9
Total (1-34)	224	326	425

Annex 2. Correlation coefficients between the volumes of lagged exports and GNP in Finland in 1884 - 1980 (sources: as in Figure 3.1).

Period	Lag of the exports years	Exports of wood working industry	Exports of paper industry	Exports of forestry	Exports of forest sector	Total exports
	0	0.87	0.98	-0.01	0.93	0.98
	1	0.82	0.93	-0.01	0.89	0.91
1884-	2	0.81	0.89	0.01	0.85	0.85
1980	3	0.77	0.85	0.04	0.81	0.80
	4	0.75	0.83	0.06	0.79	0.74
	5	0.74	0.80	0.09	0.77	0.70
Weakening of the correlation						
	(0-5)	.13	.18	.	.16	.28
	0	0.96	0.95	0.95	0.95	0.97
	1	0.76	0.78	0.79	0.74	0.78
1890-	2	0.63	0.60	0.69	0.62	0.63
1913	3	0.53	0.44	0.60	0.54	0.49
	4	0.41	0.30	0.52	0.45	0.37
	5	0.32	0.20	0.42	0.35	0.29
Weakening of the correlation						
	(0-5)	.64	.75	53	.60	.68
	0	0.62	0.94	0.32	0.83	0.97
	1	0.61	0.77	0.29	0.72	0.84
1920-	2	0.42	0.55	0.10	0.46	0.59
1939	3	0.20	0.46	-0.05	0.30	0.36
	4	0.03	0.30	-0.21	0.10	0.18
	5	-0.12	0.18	-0.36	-0.05	0.03
Weakening of the correlation						
	(0-5)	.74	.76	.	.83	.94
	0	0.75	0.95	-0.73	0.83	0.98
	1	0.59	0.87	-0.72	0.77	0.88
1948-	2	0.60	0.79	-0.70	0.70	0.78
1980	3	0.49	0.72	-0.65	0.65	0.68
	4	0.44	0.68	-0.61	0.61	0.60
	4	0.41	0.64	-0.56	0.58	0.52
Weakening of the correlation						
	(0-5)	.34	.31	.	.25	.47

Annex 3. Basic development indicators for developing countries (World Bank 1988, p. 187).

Table A.1 Population growth, 1965 to 1986, and projected to 2000

Country group	1986 population (millions)	Average annual growth (percent)				
		1965–73	1973–80	1980–86	1986–90	1990–2000
Developing countries	3,528	2.5	2.1	2.0	2.1	1.9
Low-income countries	2,374	2.6	2.0	1.9	2.0	1.8
Middle-income countries	1,154	2.5	2.4	2.3	2.2	2.0
Oil exporters	475	2.6	2.6	2.6	2.5	2.3
Exporters of manufactures	2,081	2.5	1.8	1.6	1.7	1.5
Highly indebted countries	570	2.6	2.4	2.4	2.3	2.2
Sub-Saharan Africa[a]	399	2.7	2.8	3.1	3.3	3.2
High-income oil exporters	20	4.8	5.5	4.2	4.0	3.4
Industrial countries	742	1.0	0.7	0.6	0.5	0.4
World[a]	4,290	2.2	1.9	1.8	1.8	1.7

a. Excludes nonmarket industrial economies.

Table A.2 Population and GNP per capita, 1980, and growth rates, 1965 to 1987

Country group	1980 GNP (billions of dollars)	1980 population (millions)	1980 GNP per capita (dollars)	Average annual growth of GNP per capita (percent)					
				1965–73	1973–80	1980–84	1985	1986[a]	1987[a]
Developing countries	2,096	3,130	670	3.9	3.1	0.7	3.3	3.1	1.8
Low-income countries	573	2,124	270	2.9	2.6	5.1	7.2	4.2	3.1
Middle-income countries	1,523	1,006	1,510	4.5	3.1	−1.4	1.1	2.3	1.1
Oil exporters	523	407	1,290	4.8	3.1	−2.4	1.3	−1.7	−1.3
Exporters of manufactures	949	1,889	500	4.7	3.9	3.4	6.4	5.8	3.5
Highly indebted countries	876	494	1,770	4.5	2.8	−3.7	1.7	1.9	−0.5
Sub-Saharan Africa	198	331	600	3.7	0.7	−4.9	2.9	−0.2	−4.6
High-income oil exporters	227	16	14,540	4.2	5.6	−7.7	−8.2	−10.1	5.7
Industrial countries	7,701	716	10,760	3.6	2.1	1.3	2.4	2.0	2.2

a. Preliminary.

Annex 4. GNP, GNP per capita and its growth in low-income countries in 1981 (Poats 1983).

	GNP/ capita, 1981 US$	GNP/ capita, 1971-81 Real growth (% per year)	GNP, 1981 million US$
Least-Developed Countries			
Afghanistan	180	2.4	3,500
Bangladesh	140	1.2	12,340
Benin	330	1.1	1,010
Bhutan	80	-0.2	110
Botswana	900	8.6	820
Burundi	240	1.1	950
Cape Verde	310	3.8	100
Central African Rep.	330	-0.9	680
Chad	120	-4.5	530
Comoros	310	-2.7	100
Djibouti	480	-5.3	180
Equatorial Guinea	470	3.7	180
Ethiopia	140	0.8	4,240
Gambia	350	0.5	200
Guinea	300	-0.2	1,560
Guinea-Bissau	190	1.3	130
Haiti	300	1.1	1,570
Laos	100	6.7	360
Lesotho	540	8.1	730
Malawi	260	1.4	1,630
Maldives	270	1.0	70
Mali	190	1.2	1,140
Mayotte	220	0.8	10
Nepal	160	0.2	2,460
Niger	340	-0.4	1,650
Rwanda	250	1.8	1,270
Sao Tome & Principe	380	-0.3	30
Sierra Leone	320	-1.0	1,120
Somalia	280	0.7	1,240
Sudan	380	-0.6	6,720
Tanzania	300	1.4	5,840
Togo	390	-0.3	870
Uganda	1,500	-4.2	5,360
Upper Volta	240	1.8	1,280
Western Samoa	860	2.5	140
Yemen	460	4.8	3,180
Yemen, Dem.	510	7.6	970
TOTAL	280	-0.5	64,250
India	250	1.5	162,000
Other Low-Income Countries			
Angola	790	-7.3	7,180
Bolivia	1,140	0.8	7,600
Burma	180	2.3	5,740
Egypt	710	5.3	31,750
El Salvador	720	-1.4	3,430
Ghana	1,370	-4.9	21,190
Honduras	670	0.0	2,600
Indonesia	520	4.9	81,760
Kampuchea	110	-2.9	740
Kenya	430	2.2	6,210
Liberia	540	-1.2	930
Madagascar	330	-2.6	2,820
Mauritania	480	-0.3	710
Mozambique	230	-5.6	2,700
Pakistan	350	2.3	29,990
St. Helena	440	–	–
St. Vincent	520	-0.68	70
Senegal	500	-0.2	2,340
Solomon Islands	620	2.0	160
Sri Lanka	300	3.4	4,330
Tokelau Islands	550	–	–
Tonga	500	1.28	60
Turks & Caicos Islands	470	-1.58	–
Tuvalu	550	-2.88	–
Vanuatu	550	-0.78	70
Viet Nam, Soc. Rep.	180	-1.28	10,150
Zaire	220	-2.9	5,870
Zambia	590	-2.6	3,140
TOTAL	440	1.4	231,630

Annex 5. Growth of export volume, 1965 to 1987 (World Bank 1983, p. 191).

Country group and commodity	Average annual change in export volume (percent)					
	1965–73	1973–80	1980–84	1985	1986[a]	1987[b]
By commodity						
Developing countries	4.9	4.7	4.7	3.3	5.7	5.9
Manufactures	11.6	13.8	9.5	3.3	4.9	9.5
Food	2.9	4.3	1.7	4.3	4.1	4.2
Nonfood	2.7	1.2	0.1	7.9	5.9	4.2
Metals and minerals	4.8	7.0	−0.2	7.8	11.1	1.2
Fuels	4.0	−0.8	1.8	0.7	6.8	0.0
World[c]	8.8	4.4	1.4	3.0	3.7	4.3
Manufactures	10.7	6.1	3.8	4.3	1.8	4.8
Food	5.0	6.6	0.8	0.9	4.4	8.2
Nonfood	3.1	1.0	0.6	8.1	−0.3	7.6
Metals and minerals	6.8	8.7	−0.7	3.9	3.6	10.6
Fuels	8.6	0.0	−5.0	−2.6	12.3	−2.9
By country group						
Developing countries	4.9	4.7	4.7	3.3	5.7	5.9
Manufactures	11.6	13.8	9.5	3.3	4.9	9.5
Primary goods	3.7	1.2	1.3	3.3	6.4	2.8
Low-income countries	2.0	4.7	5.4	7.7	10.4	6.2
Manufactures	2.4	8.2	9.6	0.7	15.0	9.3
Primary goods	1.7	2.8	2.4	13.7	6.9	3.6
Middle-income countries	5.3	4.8	4.6	2.7	5.0	5.8
Manufactures	14.9	14.8	9.4	3.6	3.5	9.5
Primary goods	3.9	1.1	1.2	1.8	6.3	2.7
Oil exporters	4.1	−0.9	0.4	0.0	3.2	−1.0
Manufactures	10.1	3.4	24.5	3.6	3.9	6.7
Primary goods	4.0	−1.0	−1.0	−0.4	3.1	−1.8
Exporters of manufactures	8.4	9.8	9.3	4.1	8.2	12.2
Manufactures	11.6	14.0	10.2	2.8	7.8	12.8
Primary goods	5.5	3.4	7.4	7.2	9.1	10.9
Highly indebted countries	3.1	1.1	0.9	0.5	−2.6	−0.4
Manufactures	13.4	10.2	5.6	−2.3	−11.5	3.4
Primary goods	2.4	−0.4	−0.3	1.3	0.2	0.4
Sub-Saharan Africa	15.0	0.1	−7.5	9.9	0.8	−6.8
Manufactures	7.5	5.6	2.9	12.5	2.3	−0.3
Primary goods	15.3	−0.1	−8.2	9.7	0.7	−7.4
High-income oil exporters	12.8	−0.6	−16.3	−15.4	24.9	−8.8
Industrial countries	9.4	5.4	2.5	4.2	1.9	4.6

a. Estimated.
b. Projected.
c. Excludes nonmarket industrial countries.

Annex 6. Change in export prices and terms of trade (average annual percentage change), 1965 to 1987 (World Bank 1988, p. 192).

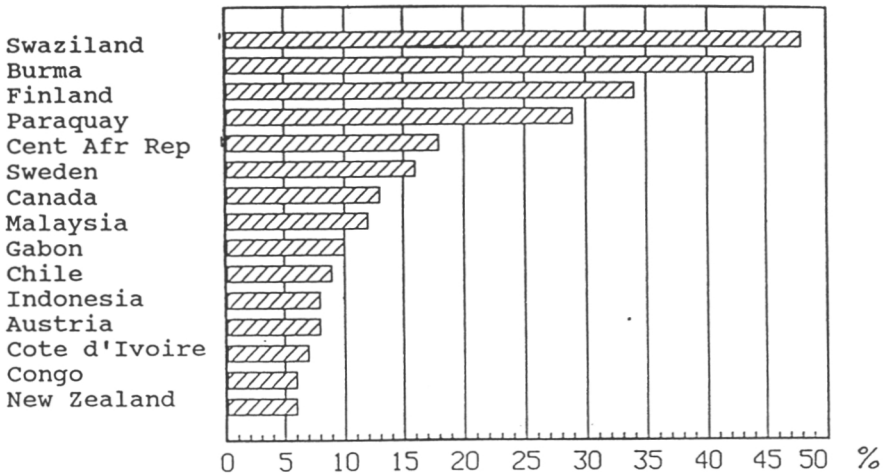
Country group	*1965–73*	*1973–80*	*1980–84*	*1985*	*1986[a]*	*1987[b]*
Export prices						
Developing countries	6.4	14.0	−3.2	−4.0	−6.4	12.2
Manufactures	7.2	8.1	−2.7	−1.1	12.0	10.9
Food	5.3	9.1	−2.3	−9.8	4.9	−4.3
Nonfood	4.5	10.3	−4.1	−13.8	0.1	23.8
Metals and minerals	2.5	4.7	−5.2	−5.5	−4.2	13.2
Fuels	8.0	27.1	−4.0	−3.5	−47.2	23.9
High-income oil exporters	7.6	26.9	−4.1	−2.6	−45.3	20.8
Industrial countries						
Total	4.8	10.4	−3.5	−0.6	13.9	8.4
Manufactures	4.6	10.8	−3.4	0.9	19.8	9.4
Terms of trade						
Developing countries	0.7	1.6	−0.9	−2.3	−7.3	0.6
Low-income countries	1.7	−2.5	0.0	−3.6	−2.0	0.5
Middle-income countries	0.6	2.2	−1.0	−2.1	−7.9	0.4
Oil exporters	0.0	10.0	−1.8	−3.1	−38.7	9.3
Exporters of manufactures	1.8	−2.7	0.3	−0.4	3.9	−2.4
Highly indebted countries	1.4	3.5	−0.7	−2.3	−14.3	−0.5
Sub-Saharan Africa	−8.4	4.8	−1.4	−5.9	−23.5	1.1
High-income oil exporters	0.3	13.4	−2.3	−2.2	−49.1	7.6
Industrial countries	−1.0	−3.0	0.1	1.7	9.5	−0.1

a. Estimated. b. Projected.

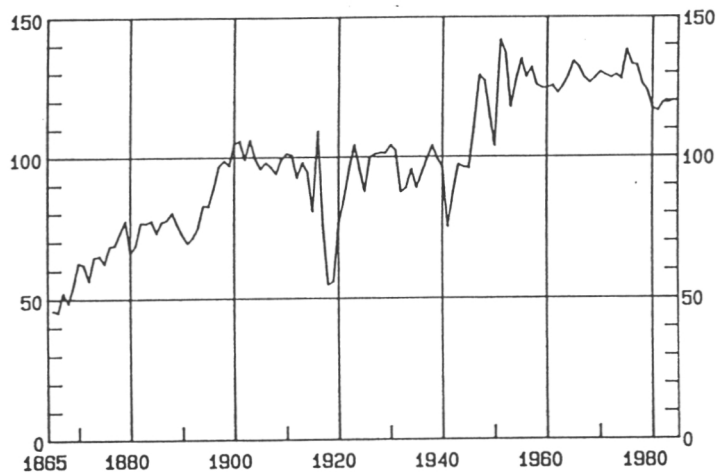
Annex 7. Export Performance, 1950-80 (Reynolds 1985, p. 410-411).

Country	Growth of Merchandise Exports (percent per year) 1950–60	1960–70	1970–80	1950–80	Exports/GDP[a] (percent) 1950–52	1978–80	Change (percent of GDP)
South Korea	1.4	39.6	37.2	29.7	1.2	28.1	+26.9
Taiwan	9.3	21.7	15.7[12]		9.2	53.6	+44.4
Iraq	14.0	5.5	40.2	14.9	24.9	58.0[9]	+33.1
Brazil	−2.0	7.2	21.7	8.9	9.0	9.1	+ 0.1
Thailand	1.5	5.1	24.6	10.1	18.2	18.8	+ 0.6
Malaysia	0.6	4.3	24.5	8.2	52.0[3]	51.7	− 0.3
Nigeria	4.1	8.1	33.1	15.3	26.5	21.1	− 5.4
Indonesia	−1.1	1.7	35.3	9.8	18.4[8]	31.7	+13.7
Turkey	0.0	6.0	16.2	7.7	7.6	3.9	− 3.7
Egypt	0.1	4.5	12.9	5.6	19.2	10.0	− 9.2
Iran	36.4	12.6	22.9	21.2	6.0	26.8	+20.8
Algeria	3.0	3.8	30.6	11.4	24.7	31.0[10]	+ 6.3
Colombia	0.4	4.0	19.8	6.2	12.0	13.1	+ 1.1
Pakistan	−4.2	10.3	13.2	6.9	8.9	9.9	+ 1.0
Philippines	4.5	7.5	17.7	9.1	9.6	14.0	+ 4.4
Kenya	8.0	6.8	16.9	11.0	18.5	18.6	+ 0.1
Mexico	3.4	5.9	25.7	8.6	9.8	6.1	− 3.7
Venezuela	8.1	1.2	19.9	7.6	34.1	26.0	− 8.1
Ivory Coast	4.5	11.7	22.2	11.9	28.3[5]	30.1[11]	+ 1.8
Morocco	5.0	3.7	15.9	7.2	19.6	15.7	− 3.9
Sri Lanka	0.9	−1.4	13.0	2.5	33.9	27.7	− 6.2
Argentina	2.3	5.0	20.4	7.9	5.8	10.8	− 5.0
Tanzania	3.5	5.0	7.6	5.7	26.0[2]	10.9	−15.1
Chile	3.7	10.2	16.0	7.9	15.3	17.8	+ 2.5
India	0.0	3.7	15.9	6.0	6.7[7]	4.9	− 1.8
Ethiopia	6.6	5.1	13.6	7.6	7.6[6]	9.9	+ 2.3
Burma	1.0	−8.8	14.1	−0.2	20.6	6.2	−14.4
Peru	6.2	8.4	13.9	9.0	18.0	25.6	+ 7.6
Zimbabwe	5.3	5.6	12.9	9.0	n.a.	25.6	n.a.
Zambia	6.6	13.4	4.7	7.3	74.6	36.4	−38.2
Zaire	4.5	6.1	7.9	4.9	38.8	20.8	−18.0
Nepal						6.0[11]	n.a.
Mozambique	6.2	7.0	−4.0	5.2			n.a.
Sudan	2.6	3.4	7.4	5.5	17.5[4]	7.0	−10.5
Uganda	3.1	7.1	4.2	5.2	27.9[1]	4.2	−23.7
Ghana	3.1	2.2	10.9	5.4	32.2	10.4[10]	−21.8
Afghanistan	2.6	4.3	20.6	8.2	4.1	11.7[10]	+ 7.6
Medians							
Tier 1	1.0	6.0	24.5	10.0	18.3	24.6	
Tier 2	4.5	6.8	19.9	9.1	12.0	18.6	
Tier 3	3.5	5.0	14.1	7.2	18.0	10.9	
Tier 4	3.8	5.8	7.9	5.2	30.0	11.1	

Annex 8. The share of forest products from the value of total exports (%): the leading countries in the order of magnitude in 1985 - 1986 (sources: FAO 1988; World Bank 1988).



Annex 9. Finland's terms of trade during 1865 - 1985, 1926 = 100 (Hjerppe 1988, p. 140).



Annex 10. Forest sector investments by transnational corporations in Africa, Asia and the Pacific (Contreras 1987, p. 41).

Table 1. **Accumulated investment in the forest-based sector of selected countries in Africa**

(In millions of US dollars)

	Foreign	Domestic	Total	% Foreign
Côte d'Ivoire	558.80	145.00	703.80	79
Cameroon	365.41	335.71	701.12	52
Congo	157.20	28.60	185.80	85
Central African Republic	92.21	12.79	105.00	88
Zaire	95.03	54.44	149.97	64
Liberia	124.87	22.03	146.90	85
Nigeria	932.16	621.44	1 553.60	60
Gabon	364.46	94.07	458.53	79
Ghana	175.45	207.15	382.60	46
Total	**2 865.59**	**1 521.23**	**4 387.32**	**65**

Estimate assumes that the proportional age structure of all investments in all countries is the same. No recent studies have been done on the age structure of African forest-based sector investments to be able to adjust figures according to age structure.
Investment costs per unit of capacity vary from country to country. Most of these figures have been derived in Côte d'Ivoire with the Ministry of Economics, Finance and Planning, and double-checked using different reports of World Bank missions. They are assumed to be the following:

- logging investment costs range from US$71/m^3 in Côte d'Ivoire to US$142/m^3 in Gabon;
- sawmilling investment costs range from US$190/m^3 of output capacity in Côte d'Ivoire to US$380/m^3 in Gabon;
- veneer investment costs range from US$620/m^3 of output capacity in Ghana to US$1 050/m^3 in the Congo.

Table 2. **Accumulated investment in the various activities of the forest-based sector of selected countries in Africa**

(In millions of US dollars)

	Foreign		Domestic		Total	
	Value	%	Value	%	Value	%
Logging	930.06	33	404.06	27	1 334.12	30
Sawmilling	738.47	26	428.50	28	1 166.97	27
Wood-based panels	726.65	25	243.08	16	969.73	22
Pulp and paper	467.20	16	442.80	29	910.00	21
Total	**2 862.38**	**100**	**1 518.44**	**100**	**4 380.82**	**100**

Table 3. **Estimate of foreign direct investment in the forest-based sector in major Asian and Pacific timber-producing countries**

(In millions of US dollars)

Indonesia	380
Malaysia	360
Papua New Guinea	115
Philippines	303
Total	**1 158**

Source Gillis (1981)

Annex 11a. Schemes of forest industry complexes (Lehtikoski 1987, p. 171).

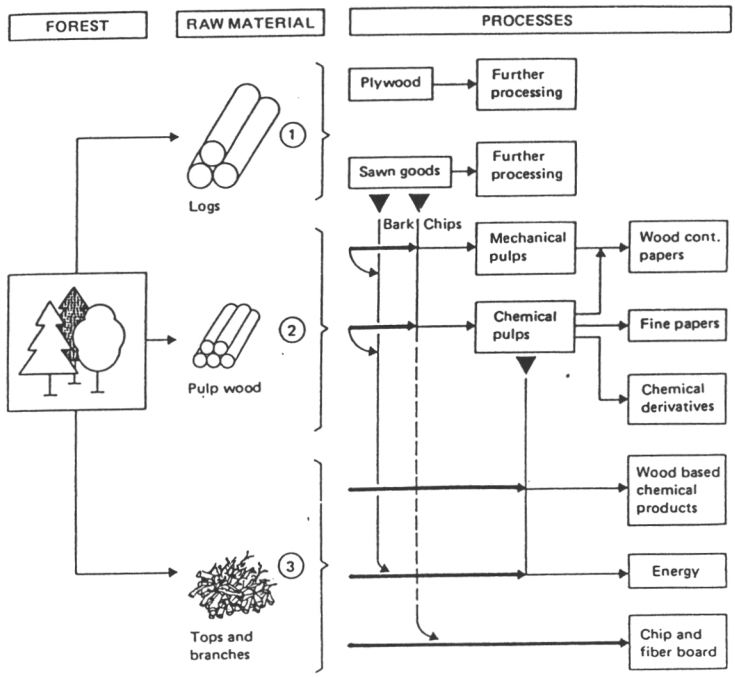


Figure 7.1 The principle of forest industry integration based on optimal wood utilization.

Producing these types of products in an integrated plant reduces production costs for several reasons:

(1) Reduced raw-material transport costs.
(2) More efficient harvesting, so reduced costs.
(3) Total usage of tree.
(4) More efficient energy utilization.
(5) Vertical process integration.

Annex 11b. Schemes of forest industry complexes (Lehtikoski 1987, p. 182, 189).

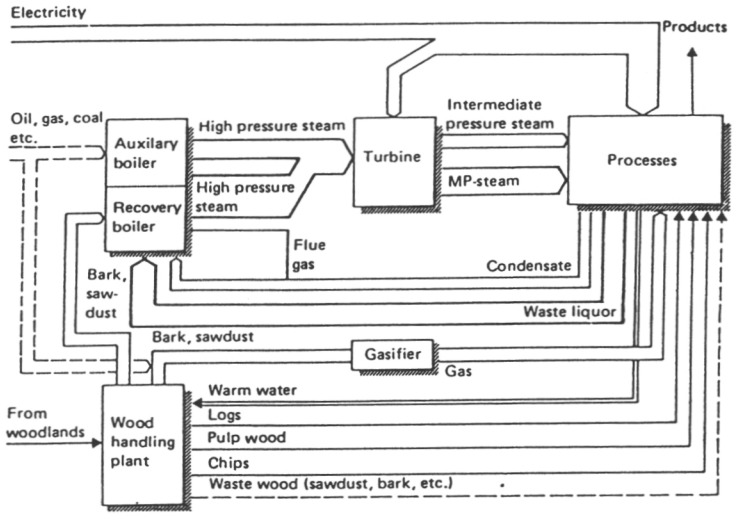


Figure 7.5 Energy diagram of an integrated wood-processing mill.

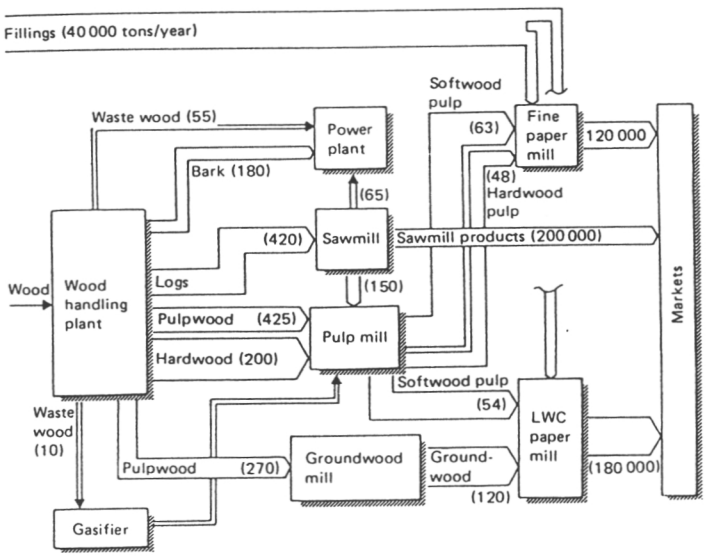
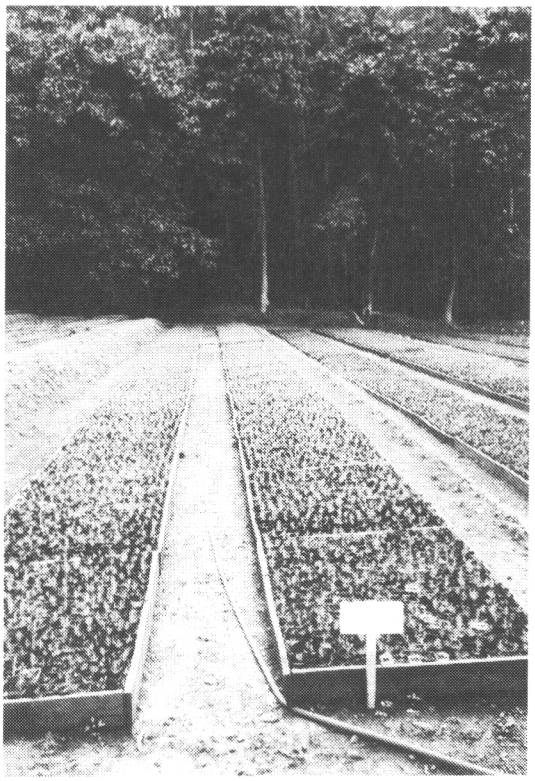
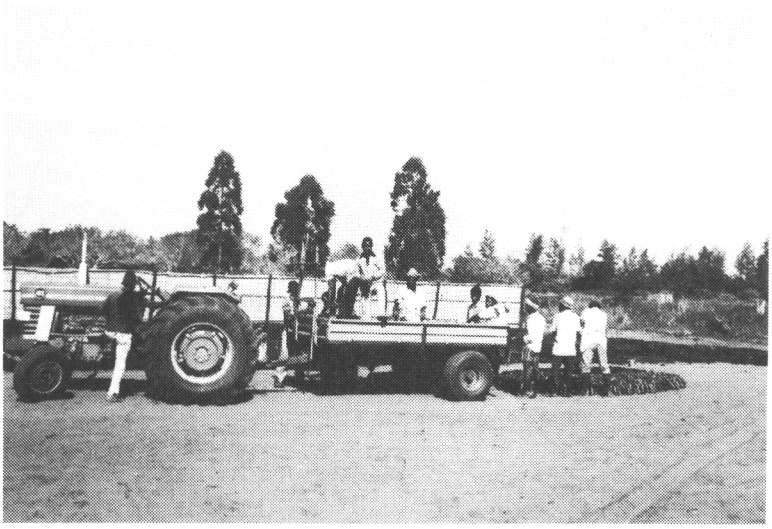


Figure 7.8 Material flow for the hypothetical integrated forest industry unit (wood, m^3/year; fibers, m^3/year; fillers, tons/year or 10^3 tons/year).





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LAND REFORM - A WEAPON AGAINST TROPICAL DEFORESTATION?

Jyrki Salmi

ABSTRACT

Most developing countries are still predominantly agrarian economies, and therefore the foundations of economic development should be agrarian development. However, social and economic development is difficult when landownership is extremely skewed and there are feudal characteristics in the structure of economy. In this kind of situation, which is common in Latin America and Asia, land reforms and broader rural reforms are needed. However, the land reforms are difficult to execute. Those methods that leave the final decision to the individuals, e.g. tax-induced land reform, might be politically more acceptable than the coercive ones. The increase in agricultural productivity and the overall economic growth and social development, caused by the land reforms, could contribute to nature conservation and especially to the survival of tropical forests.

Keywords: land reform, economic development, deforestation.

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1. RURAL SECTOR AND ECONOMIC DEVELOPMENT

The importance of the agricultural sector in the economic development of the developing countries is widely accentuated in recent textbooks on development economics (Meier, 1984; Todaro, 1981). Agriculture and the whole rural sector have often been undervalued or even forgotten by the development economists and politicians of the last decades. The whole floor was given to rapid industrialization, which led to economical dualism with an enclave, modern, export-oriented, urban industrial sector and a static, traditional, rural agricultural sector. The wide gap between the wages and overall living conditions of these two sectors led to migration from rural to urban areas. However, the industrial sector did not grow rapidly enough to be able to absorb all the rural emigrants. The reason for this was the limited size of the markets for industrial products: for international markets either the quality was too low or the price too high due to the low productivity. The demand in the national markets was limited to a small urban elite. The bulk of the population, rural dwellers and urban poor, could not afford to buy the goods produced.

Uncontrolled expansion of the cities with its consequent increase in urban unemployment, delinquency and human misery were recognized by the politicians living in the cities. At the same time many of the developing countries were facing a chronic deficiency in food production. Large portions of the foreign export earnings had to be used for food imports. It has recently been recognized and accepted that the developing countries are still predominantly agrarian economies. However, the great heterogeneity among the group is to be accentueited. Thus, strongly simplifying, we can claim that economic development should be agrarian development. Step by step the development process will lead from subsistence agriculture to industrialization. Different modes of production cannot be mixed with each other.

The main problem of agriculture in the developing countries has been low productivity, which consequently is one of the principal causes of Third World poverty. Thus the green revolution of the late 60's was greeted everywhere with great enthusiasm. It was hoped that the new improved varieties of cereals, which multiplied the yield of the crops, would solve the agrarian problems through increasing productivity. However, the magnificent results were achieved only in the modern, large-scale and capital intensive agricultural sector. The bulk of the rural population was left untouched by such developments or, on the contrary, their income were reduced due to the introduction of less labour-intensive technologies.

The unsatisfactory results of the green revolution highlighted the nature of the agricultural productivity in the developing countries. The limiting factors were often more structural than technical. Thus one important reason for the failure of the green revolution to fully meet expectations was that it did not change the static socio-economic structures, and which prevented broad-scale development of the rural economies of the Third World. Highly concentrated land tenure is an effective inhibitor to the industrialization of any country. Feudal[1]-type landownership maintains a restrictive dual economy.

Thus industrialization seems to be difficult to achieve in a feudal state, and in reality feudalism still prevails and dominates the rural socio-economical structure of many developing countries. This is particularly true in Latin America, where extremely concentrated landownership with many feudal characteristics is still dominating. The landless agricultural workers or the smallholders living at subsistence level, being totally uneducated and totally lacking an urban and industrial tradition cannot be considered a fully fledged labour reserve for

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[1] NB The concept of feudalism is used here in a very broad sense, like in the Marxist tradition. Here it refers to the economic and social structures of landownership which could be found in the feudal states at medieval Europe.

industrialization. Neither do the large landowners have any interest investing in industrialization. The feudal state is static, opposing every change in its structure. There is no hope for change until the feudal structures have been abolished. This can be done in many ways, some of which might be more violent and bring more human suffering than others.

2. DISTRIBUTION OF THE LANDOWNERSHIP

2.1 Situation in the developing countries

Despite the lack of accurate statistics, landownership is known to be highly concentrated in most of the developing countries. The inequalities are worst in Latin America where the traditional encomienda/hacienda-type of ownership resembles the medieval European feudal landownership pattern. It should be noted here, to avoid misunderstandings, that the statement above is a strong simplification. In practice, both the agricultural production and land ownership systems vary considerably according to the regions.

In Asia and the Middle East, the predominant problem is tenancy. The absent landlords and intermediaries tie the tenants to the land through debts. Thus, different aspects of feudal characteristics of landownership can be found especially in Latin America and Asia, where the large estates have belonged to the same families ever since the territories were last conquened. In Africa, the traditional land ownership pattern is communal. The problems of communal ownership are outside the scope of this article. More about the theme can be found, for example, in Adeyoju (1975).

The World Bank (1975a) estimated that 80 % of all holdings in the world are less than five hectares in size, with about 40 % of them being less than one hectare. These holdings account for approximately 20 % of all cultivated land, and only 7 % of all land holdings (Table 1.). In Latin America the situation is especially skewed; less than 20 % of the holdings (larger than 50 hectares) account for over 90 % of the total area of holdings, and more than one-third of all holdings (those less than five hectares) account for only 1 % of the area (Table 2.). In Latin America the pattern is particularly skewed in Colombia, Paraguay and Peru (Table 3.).

Table 1. Distribution of holdings by size (World Bank 1975a).

Size distribution (hectares)	Number of holdings (millions)	Number of holdings Percentage distribution	All farmland in holding (%)	Cropland in holding (%)
Under 1	53.90	38.90	1.10	3.40
1 - 2	26.55	19.20	1.70	5.30
2 - 5	28.73	20.70	4.00	12.00
5 - 10	13.24	9.60	4.20	11.50
10 - 20	7.27	5.20	4.40	10.70
20 - 50	4.40	3.20	5.80	11.80
50 - 100	1.97	1.40	5.80	9.80
100 - 200	1.40	1.00	6.60	11.00
200 - 500	0.67	0.48	8.60	11.50
500 -1000	0.23	0.16	6.50	5.90
1000 and over	0.23	0.16	51.30	7.10
Total	138.59	100.00	100.00	100.00

Table 2. Distribution of holdings above one hectare (World Bank 1975a).

	1 - 5 hectares		5 - 50 hectares		more than 50 ha	
	% holdings	% area	% holdings	% area	% holdings	% area
Europe	50.0	13.0	47.4	52.3	2.4	34.7
North and Central Amer.	23.4	0.5	39.4	8.0	37.2	91.5
South America	36.4	1.0	45.5	8.5	17.8	90.5
Asia	78.2	40.7	21.6	50.2	0.2	9.1
Africa	73.2	3.7	23.7	6.3	3.1	90.0
Oceania	5.5	-	27.7	0.5	66.0	99.5

Table 3. Distribution of holdings above one hectare in selected South American countries (World Bank 1975a).

	1 - 5 hectares		5 - 50 hectares		more than 50 ha	
	% holdings	% area	% holdings	% area	% holdings	% area
Argentina	14.9	0.1	38.5	2.4	46.6	97.5
Brazil	28.1	1.0	52.6	12.8	20.3	86.2
Chile	37.7	0.7	30.3	5.2	32.0	94.1
Colombia	50.3	4.1	40.6	10.1	9.1	85.8
Paraguay	43.5	1.1	51.0	6.6	6.5	92.3
Peru	73.8	4.2	22.9	8.0	3.3	87.8
Uruguay	14.7	0.2	49.2	4.6	36.1	95.2
Venezuela	36.3	1.3	42.9	6.7	20.8	92.0

The skewed land distribution is a sign of unequal income and welfare distributions in the rural sector. Economic inequalities provoke social unrest, which might lead to revolution and subsequent land reform. For example, in pre-revolutionary Mexico (before 1910) the land distribution situation was extremely skewed: 1 % of the population owned 97 % of the Mexican land area, accordingly 96 % of the population owned 2 % of the land (Stavenhagen 1968). The landownership question was the immediate cause of the Mexican revolution.

2.2 Historical case-study of Finland

In the beginning of the twentieth century Finland was a predominantly agrarian economy with a skewed land tenure situation. In 1901 3/4 of the rural inhabitants were leaseholders or totally landless, and in many of the rural municipalities only 1/20 of the inhabitants cultivated their own land (Vennola 1918). Vennola (1918) further states: "Social unrest and helplessness are common features in these circumstances and form a serious threat to the nation's economic and social well-being. Thus, rapid organizing of our landownership situation is indispensable for our nation and for its development. Without it our society will be dislocated and the firm ground of our economy will collapse. Our national independence will no longer be supported by the vast majority of our citizens and it will lose all of its dignity". The situation contributed to the revolutionary upheaval of 1918. However, the problem was later solved through tenant liberation and financing programmes, which are explained in the following presentation, mainly based on a publication of Virtanen and Halme (1983).

The dissatisfaction and social unrest of the landless classes, as well as the general political will, contributed to the formulation of the first land reform measure in 1909. The existing tenancy agreements and those which had already expired were extended to the year 1916 at least. However, the Tenancy Statute of 1909 did not have any effect on the

ownership structure. The ownership question was left unsolved until 1918, when the Diet approved The Tenant Farmer Act, which gave the tenant the right to acquire the land, at most 10 hectares of cultivated land and 20 hectares of forest, he was ocupying even against the wishes of the landowner. As a result 120 000 new independent farms and housing lots were created. Of these, about 67 000 were suitable for farming. On the average, they comprised 5 hectares of cultivated land and correspondingly about 11 hectares of forest.

Even if the tenancy problem had been settled, the still wider problem of totally landless rural people remained unsolved. After a heated debate, the Diet ratified a law in 1922, called "Lex Kallio", which made it possible to acquire land primarily from state land holdings, secondly by voluntary sales agreements and thirdly by expropriation of land of various industrial concerns, abandoned and run-down farms, farms purchased for speculation or, in ultimate cases, normal privately owned farm land. The acquired land was given either to landless rural dwellers or as additional land to farms that were considered to be too small. As a result of "Lex Kallio" and its successor the "Land Settlement Act" of 1936, 1 260 000 hectares of land were acquired and redistributed to form 24 300 small farms, 19 200 housing lots and additional land was given to 27 000 small farms.

At the end of the Second World War, Finland had to cede 45 800 square kilometers of her land (i.e. 12 % of the land area) to the Soviet Union. The inhabitants of the ceded areas, totalling 480 000, moved to the remaining part of Finland, thus creating an extensive resettlement problem. The Evacuee Rapid Resettlement Act of 1940, The Land Acquisition Act of 1945 and the so-called Second Compensation Act of the same year were the principal legislative measures used to solve the problem. The basic principle was to compensate for the property lost by the displaced population. The funds for this purpose were collected by means of a special property cession tax.

The land for resettlement purposes was taken primarily from state-owned land or that acquired by voluntary sales agreements, secondly from the expropriations of abandoned or run-down farms, land speculators, companies, foundations, municipalities, parishes and private individuals who did not earn their living from farming. Secondary relinquishers were full-time farmers who, after ceding land, would still have at least the equivalent amount of land as that for agricultural holdings prescribed in the Land Acquisition Act.

Accordingly, 140 000 holdings were formed and a huge construction programme, on behalf of the evacuees themselves, was implemented because the majority of the newly created holdings lacked any kind of facilities.

As a result of the these land reforms 5.5 million hectares were redistributed and 345 000 farms or other areas consequently formed. In addition, 6000 long term rental agreements were confirmed by the authorities. Land was thus obtained by 350 000 families. Only about 30 % of the redistributed land was originally state-owned. The rest, 70 %, was acquired by expropriations or by voluntary sales agreements.

The living conditions of the tenant farmers and landless rural inhabitants were considerably improved. Despite widespread fears, the reforms did not reduce agricultural production, on the contrary, production was increased. The newly independant farmers became active in co-operation and their own farming and forestry organizations, which further increased their educational level and social status.

The most important reasons for the success of the Finnish land reforms have been considered to be the following: 1) sufficiently wide and real political will; 2) solutions successful from the legal and administrative point of view; 3) a competent and loyal civil administration in the implementation of the reforms, and 4) the activeness and initiative of the land receivers in land acquisition, land clearing and home building. However, we should not forget the

importance of the extensive emigration to America which reduced the population pressure. The same holds true for many other European countries.

3. REASONING FOR LAND REFORMS

3.1. Factor productivity

There is a lot of empirical evidence about the negative correlation between farm size and land productivity (Montgomery 1984, World Bank 1975a & b, Owens & Shaw 1972). The small-scale farmers have to utilize every inch of their land efficiently, whereas the owners of large holdings often leave significant portions of the land without cultivation that could potentially be cultivated. The small-scale farmers intensively use the labour force of their own family. The labour productivity of small-scale producers is lower than that of the large farms, where the division of labour can be rationally implemented. However, in the developing countries labour is not the factor limiting production, it is the capital and, often, the availability of land. According to King (1977), one of the most powerful arguments for land re-distribution is that it can give people work by reducing enforced leisure. Moreover, the capital-intensive production techniques of the large farms may have an unfavorable balance of payments-effect on the national economy.

3.2 Employment

One of the great problems of the developing countries is the extremely rapid rate of urbanization, and especially the growth of the urban slums. The urban drift is mobilized by the wage differences between the rural and urban areas, which favour the latter. As long as urban wages rise more rapidly than average rural incomes, rural-urban migration will continue in spite of rising urban unemployment. All policies that could reduce the imbalance between urban and rural income would, therefore, be desirable (Meier 1984, p. 211).

The existence of a dual economy may be beneficial to entrepreneurs. Due to the low productivity (and thus low wages) of the rural sector, the modern sector can always find cheap labour. Of course the unskilled rural emigrants are not of much value to the entrepreneurs, who require for a

qualified and skilled labour force. However, the unemployed masses invading the cities undoubtedly have a certain psychological effect in wage negotiations. The laborers tend to accept lower wages rather than become one of the unemployed masses.

It seems quite obvious that in many cases there is no possibility to sufficiently increase urban employment. The urban labour markets cannot absorb the increasing rural immigrants. If urban employment rises, the urban "pull" will rise accordingly. Thus policies should concentrate on reducing the rural "supply push", and help contain the labour force in rural areas. Urban problems are, fundamentally, rural problems: urban "pull" must be offset by lessening the "push" through rural development (Meier 1984, p. 211).

3.3 Income equality

Consumer demand for food, clothing, shelter and other major commodities, is mainly a function of income and is little effected by relative prices (Chenery 1975, Nurkse 1953, Rosenstein-Rodan 1943). The key question is thus to increase the incomes of the low-income level consumers, whose demand is directed mainly towards basic products of the home-market, whereas the marginal demand of high-income level consumers tend to be directed towards imported goods (in developing countries). The increase in the demand for home-market products leads to resource allocation and investments in the local industry producing consumer goods. The accelerator principle and spread effects diversify the base of the economy and accelerate its growth.

3.4 Marketed surplus and savings

It has been argued that the high marginal propensity of the rich elite to save secures indispensable internal savings and thus provides capital for investments. On the other hand, a more equitable income distribution would lead to diminished savings and thus to reduced investments.

However, according to Streeten (1979), small farmers with access to improved agricultural technologies save as high a proportion of their incomes as large farmers. Historical evidence also supports this view. We merely have to look at Japan, Korea or Taiwan, which have experienced phenomenal economic growth, associated with some of the most equal income distributions outside the socialist world (Ranis 1977, Adams 1973). Secondly, the consumption preferences of the rich elite presumably tend to incline towards imported luxury goods and tourism. It is a commonly accepted fact that imported items are always more "luxurious" than local ones and are thus more tempting.

One of the most serious threat to the economy in some Latin American countries especially is the clandestine and open out-flow of capital. The middle or lower classes do not have the possibility to transfer their assets abroad. Instead, the lower and middle classes can fulfill their needs (which are more "basic needs") by consuming locally produced goods and services, i.e. food, house construction, furniture, clothing etc. The consumption pattern of the middle and lower income classes thus accelerates the development of the domestic industry through intermediate and final demand linkages. This means that a strong middle class is the prerequisite for industrialization. This is the corner stone also in Adelman's (1984) "agricultural-demand-led-industrialization" (ADLI)-stategy: The industrialization goal will be reached by expanding internal demand for intermediate and consumer goods produced by domestic industry, whereas the internal demand can be increased by increasing the local purchasing power through increasing agricultural productivity.

In the poor living conditions of developing countries, an increase in current consumption may actually lead to an expansion in future production through improved labour productivity. If nutrition is poor, this principle will be especially true. Thus, a relatively equal income distribution with active promotion and financial support for small and medium scale enterprises, might be a good development policy.

3.5 Development of the economic structure

Capital accumulation and unbalanced development have frequently been excused by emphasizing to the "trickle down" of the economic growth to the whole national economy. However, there is not much evidence of spread effects (or the "trickle-down"-process) in dual economies (Ranis 1977). On the contrary, in such a situation the relative backwardness of the traditional sector tends to deepen, due to its exploitation.

The fundamental problems of infant economies are, besides the discriminative structure of the world market, on the one hand, restricted home markets due to the lack of purchasing power of the majority of the population and, on the other hand, the lack of experience and competitiveness in the world markets. Usually the only way to gain experience in production is to start operating in the home markets. Thus, the key question for industrialization and economic growth is to raise the local purchasing power and hence to increase demand for domestic products.

Ceiling prices of foodstuffs, export taxes or restrictions on primary products and tariff protection on industrial inputs and consumer goods have acted as disincentives to agricultural producers, while at the same time artificially increasing the urban-rural differential. Readier access to services and public utilities such as health, education and entertainment in the rural areas, may lead to an increase in rural social wages and diminish the attractions of the city (Meier 1984, p. 211).

A limited size for land holdings does not necessarily inhibit entrepreneurship and private ambitions. If the government follows an active industrialization policy, the most enterprising farmers can start small-scale industry instead of large-scale agriculture. A wealthy and broad peasant class is the first step towards the industrialization and diversification of a national economy.

The most important task in building up a nation and overall cultural development is to improve the self-regard and self-respect of the bulk of the people. The rural landless and urban unemployed poor often lack self confidence and dignity. They have been flattened so many times that they have lost the hope for a better future. These people are thus a burden for development, for they are not "willing and able" to struggle for affluence. Galbraith (1979) has described this process, calling it "accommodation to poverty". The key question is to give people back their self confidence or, if this is no longer possible, to give self-reliance to their children, so that they can grow up to dignity and struggle for a better future.

4. LAND REFORM AND DEFORESTATION

There is wide agreement among the development economists on the need for land reforms (e.g. Meier 1948, Todaro 1981). However, it may be that not all the foresters have yet understood the unbreakable link between agricultural development and the future of the tropical forests. The western foresters especially, bear the burden of long professional traditions. The importance of a broad, interdisciplinary scope is not always understood. Among the conservative foresters land reforms are often irrationally considered as a springboard to communism. Naturally, there are also foresters who agree upon and understand the need for land reforms (e.g. Gregory 1965; Westoby 1978).

A major cause of tropical deforestation is hunger. The poor eat less than the rich, but they often need a considerably larger area (in a long time span) to produce their meagre diet than the rich do, due to the different cultivation techniques. Tropical forests are converted to agricultural land: through shifting cultivation to forest fallow, scrub lands, pasture areas or permanent fields. Depending on the soil quality, climatological and ecological conditions and cultivation techniques, the result ranges from highly productive farmland to eroded barren waste land. Were the result always to be productive farmland, there would be no reason for worry. Unfortunately, to result is too often the latter. The compensation for the potentially valuable resource is poor. The Third World countries are losing one of their assets "for peanuts".

Traditional solutions for overpopulation and landlessness have included colonization and land settlement schemes of which there are successful and disastrous examples, as well as examples of intermediate situations. There is always a threat of environmental hazards when we open up new wilderness areas for agricultural purposes and tropical deforestation gains a new foothold.

But what can be done in favour of land hungry rural poor and farmers who have no other possibilities for survival than encroachment on the forests. We cannot prevent their effort to survive, if we cannot offer them an alternative. If we look at the cross-country figures on agricultural area per person, we see that there is no severe over-all scarcity of land in Latin America (Table 4). However, the share of landless rural people is high in Latin America. The obvious reason for this is the highly concentrated land tenure. The logical result of skewed (agricultural) landownership and low agricultural productivity is poverty and illegal clearance of the virgin forests. It might be both ecologically and economically advisable to redistribute the inefficiently cultivated but already cultivatable feudal or semi-feudal agricultural holdings. Land reform and consequently growth in agricultural productivity are indispensable prerequisites for overall economic growth in a country with feudal characteristics. And further, overall economic growth is an indispensable prerequisite for the survival of the tropical forests (e.g. World Comission ... 1987).

Table 4. Agricultural land and population (Sinha 1984).

Region	Potentially cultivatable area (million hectares)	Actual arable (million hectares)	Population (million)	Arable land per capita (hectares)
Africa	733	169 (23)	456	0.37
Asia	628	449 (71)	2 509	0.18
Australia/New Zealand	154	44 (29)	22	2.0
Europe	174	142 (82)	482	0.29
North America	465	236 (51)	244	0.97
South America	680	105 (15)	239	0.44
USSR	356	232 (65)	264	0.88
Total	3 190	1 377 (44)	4 216	0.33

5. TAX-INDUCED LAND REFORM

There is ample historical evidence that land reforms are difficult to execute (e.g. FAO 1984). In many cultures, land is a symbol of permanence, power and wealth. Thus it is most natural that the landlords insist on conserving the prevailing situation. Furthermore, expropriations are perceived as attacks against capitalism and democracy. Coercive means provoke counteraction. One possibility to smooth the way for future changes would be the utilization of appropriate taxation. An effective and progressive tax on land property above a certain maximum size, might drastically reduce land prices (Scheper & Reichenbach 1975) and stimulate the land property markets. The introduction of a property tax reduces the value of land by the amount of the present value of the tax liabilities (Noguchi 1982). Land taxation is also praised for being relatively neutral in its economic effects on agriculture (Sazama & Davis 1973). The tax incomes could be channeled to the landless or nearly landless rural people.

Land property tax can be levied according to the size of holding, value of holding or current use value. The two latter tax bases can be said to be theoretically better than the first one. Current use value, being inter-temporally neutral, can be further preferred to the value of holding (Noguchi 1982). However, both of the latter tax bases can be criticized as being difficult to implement from the technical point of view (Sazama & Davis 1973). The necessary cadastral surveys are difficult to perform in developing countries, where the administrative machinery is typically weak.

An appropriate tax base could therefore be the size of a holding. If cadastral surveys can be implemented, the current use value or some less ambitious site quality correction on the size of a holding could be adequate.

The basic idea is that a progressive land tax is levied on a land holding above a certain minimum size, a progressive land tax is levied. The minimum size varies according to the

situation. However, it should not be smaller than the minimum size of a technically and economically viable farm (see e.g. Koo 1977). The marginal tax rate can be constant or even rising. However, it should be high enough to be effective in reducing the land prices and stimulating the land markets.

Figure 1 illustrates the proposition. The horizontal axis is the area of the property (acreage) of a landowner. Point A is the minimum size of a taxed farm. The vertical axis is the total land tax of a landowner. The point MV_x on the same axis is the hypothetical market value and the point UV_x is the current use value of a property x.

The curve TT is the total tax curve of a progressive and effective property tax with constant marginal tax rate. The curve TT^o is similar to the previous curve, with the exception of a rising marginal tax rate. The curve TT^* has a lower marginal tax rate than curve TT. Thus, the effectivness of curve TT^* depends on the preferences of landowner X. There are many quasi-economic preferences for holding land that affect the demand and supply of land, making them price inelastic. Preferences of this kind are for example 1) Social and political status, 2) Respect for the ancestors of the family, 3) Care for future generations and 4) Land as a store of wealth (Sazama & Davis 1973). Owing to the existence of such preferences, it is not clear whether the total tax curve TT^* is effective or not. TT^{**} is a non-effective progressive total tax curve similar to most of the existing progressive land taxes in the third world. Finally, TT^p and TT^c are non-progressive total tax curves. TT^p is a proportional total tax curve, and TT^c describes a lump-sum tax.

The net state incomes collected by progressive land taxation should be totally channelled to the rural sector. The primary utilization of these resources is, naturally, credit promotion to the tenants, landless rural workers and small scale farmers, for the purpose of land purchase. In addition, the resources can be channelled into the credit needed for 1) financing of agricultural production, 2) investments in

rural small- and medium-scale industry (both private and co-operative), and to create a broad agricultural, forestry and business extension service and training.

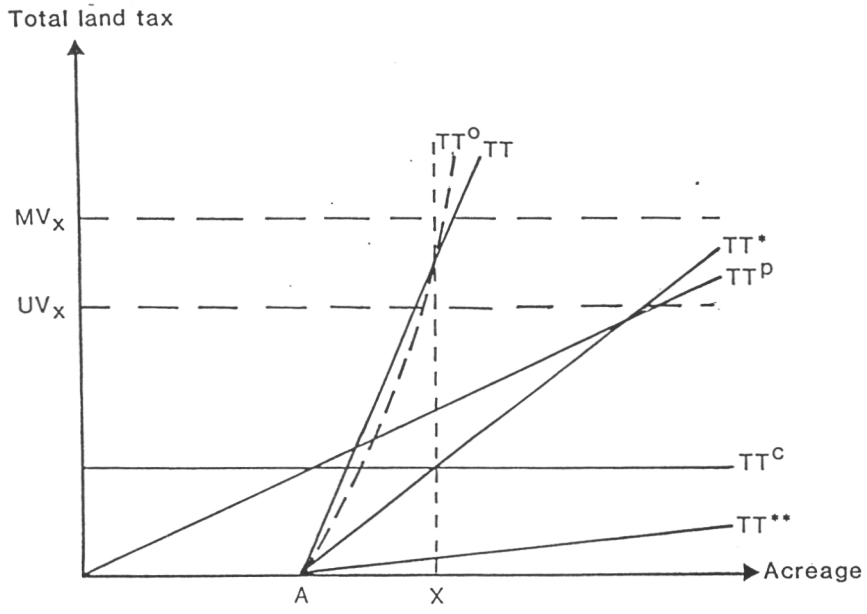

Figure 1. Total tax curves.

6. DISCUSSION

The high-level "World Conference on Agrarian Reform and Rural Development" (WCARRD) of 1979 (FAO 1979) adopted, without any fundamental disagreements, a Declaration of Principles and a Programme of Action. However, the progress towards the objectives of the conference has been slow. Only few countries have introduced significant policy changes relating to land distribution.

In most cultures, land is a symbol of permanent power and wealth. Thus, it is natural that landowners insist on conserving the prevailing situation of land tenure. Every land reform programme has been and will be attacked by the present land elite. Often the reforms fade out due to the lack of adequate institutions to implement the reforms, once legislated. A powerful organization for the implementation and follow-up is usually necessary.

Sufficiently wide and real political will is indispensable for the execution of a real land reform that changes the socio-economical structure of rural economy. If the political will exists, the method to enact the reform is a question of secondary importance, provided that neither the newly created nor the relinquisher farms will become technically or economically unproductive. However, methods that leave the final decision to the individuals might be politically more acceptable, and above all, more easy to administrate than compulsory methods - even though the liberty of decision making would be ostensible. For example, the quasi-voluntary sales agreements of the tax-induced land reform leaves space for highly variable individual preferences, even though the preferences conflicting with the national preferences (i.e. rising productivity, high employment, income equality, growth of economy, nature conservation etc.) become expensive.

Another innovative and fair possibility could be the establishment of an internationally financed land reform fund argued by Adelman (1986). However, among the donors, there might not be too much interest in a new fund, especially now

that it is seemingly difficult for them to fulfill their present commitments. Understanging of the previously explained linkages between land reforms and economic and social development as well as conservation of the nature, could change the situation.

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