Inter-American Development Bank{PRIVATE }

PROCEEDINGS

WORKSHOP ON THE USE OF FINANCIAL INCENTIVES FOR INDUSTRIAL FOREST PLANTATIONS

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These proceedings were transcribed and composed by Santiago Carrizosa of the University of Arizona under contract with the Department of Social Programs and Sustainable Development (SDS) of the Inter-American Development Bank (IDB). Subsequently, they were technically reviewed and edited by Kari Keipi, the principal organizer of the event, and William J. Vaughan, who also arranged the translation. Graciela Testa did the final editing. Thanks are extended to Sally Strain of the Administrative Department and Anna Dalton of SDS for their valuable help in arranging the event. Sally Strain also prepared the evaluation results presented in Annex 3.

Abstract

This document presents the proceedings of a workshop on financial incentives for industrial forest plantations, held at the Inter-American Development Bank (IDB) on January 19, 1995. The main objectives of the workshop were, first, to exchange ideas among workshop speakers and participants regarding the relevance of financial incentives for industrial forest plantations, and, second, to develop recommendations about the use of financial incentives in programs presented to the IDB for financing.
The workshop lasted for one day. Presentations were given by specialists from the IDB, Jaakko Poyry Consulting (UK), Ohio State University, and the World Bank. The topics that were covered included the economic conditions for the development of industrial forest plantations, experiences with the implementation of forest incentives in Argentina and Chile, and the analysis of tree plantations in the economic, political, environmental, social and institutional framework of Ecuador. Three groups were organized to discuss whether the use of financial incentives is justified for industrial plantations in Latin America, given the current policy reforms that remove market distortions, and, if so, under what circumstances. Participants were also consulted about whether the IDB should get involved in the financing of industrial plantation programs that receive financial incentives from the government.

The workshop reached several main conclusions. In Latin America, forest programs that involve the use of financial incentives should be the object of an in-depth analysis. One of the likely effects of macroeconomic, political and institutional reforms that most countries are currently implementing will be to provide the private sector with the conditions required to implement industrial forest plantations without the support of subsidies. While some countries have used incentives as an industrial policy tool to "jump start" the establishment of plantations, it is not clear that governments are better than markets in picking winners, can easily control the spread of subsidies to other industries, or resist pressure to make subsidies a permanant policy. The justification of investment projects that involve the use of financial incentive systems has to be made with economic arguments that are based mainly on the beneficial environmental and social externalities that would result from the implementation of these projects. Even if financial incentives are justified, they should be targeted and temporary. Targeted means that producers should only be offered enough money to cover their marginal cost of adoption. Producers with the lowest adoption costs and the highest benefits should be given priority over producers where the two are nearly equal. Temporary means that subsidies should be paid on a one-time basis to prevent any relationship of dependency between the government and the beneficiary.

Many countries stress social criteria for choosing low income groups as the target population. However, the efficacy of a forestry program in rural poverty reduction should be compared to other alternatives. The IDB should exercise extreme care when it considers financing industrial forest plantation projects that include government contributions to incentive systems. The Bank should analyze in detail the environmental, economic, social and institutional advantages and disadvantages of each project. Finally, it is important to emphasize that any conclusive analysis regarding the participation of the IDB in the financial support of industrial forest plantation projects should involve the participation of the government, non-governmental organizations, private sector firms, and local communities and their organizations involved with such projects.

The Use of Financial Incentives for Industrial Forest Plantations: Workshop Proceedings

Introduction

In the last two decades, most Latin American countries have used financial incentives to encourage private investments in industrial forest plantations. This initiative has often been justified by arguing that forest plantations are required to satisfy the increasing demand for wood products, generate foreign exchange, provide a source of income, employment, firewood, contribute to the alleviation of local poverty, and yield environmental benefits through recovering eroded lands, sequestering atmospheric carbon, and reducing the exploitation of the native forest by the forest industry and small producers[1].

The proliferation of the use of financial incentives by Latin American countries is the result of successful experiences like Chile's, where forest plantation subsidies promoted the growth of a strong and consolidated forest industry. Between 1960 and 1993, the area under plantations increased from 0.25 to 1.6 million ha. Today, the industrial and silvicultural activity produces a value equivalent to three percent of the GNP and employs more than 100,000 persons. In 1992, forest products exports amounted to US$1.125 million which was approximately equivalent to the value of total agricultural exports of the country. Besides, this activity has generated important environmental benefits such as the recovery of large extensions of eroded soils[2]. In the past, mostly large producers and industrial companies have been the beneficiaries of financial incentives. Today, the government is studying alternatives to target this incentive mainly to the low income population.

The Chilean experience seems to indicate that financial incentives for industrial forest plantations can generate important economic, environmental, and social benefits. However, in recent years several authors have suggested that subsidies for industrial forest plantations should be eliminated, given the market[3] and structural adjustment policies[4] that many Latin American countries are implementing. This point is supported by Stewart and Gibson (1994)[5] who, based on study cases from Bolivia, Ecuador and Costa Rica, argue that subsidies for forest plantations should be terminated once the following conditions are met: 1) the elimination of all tariff

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[1] McGaughey, S.E. and H.M. Gregersen (1988). Investment Policies and Financing Mechanisms for Sustainable Forestry Development, Inter-American Development Bank, Washington, D.C. and Ugalde, L. A. and H. M. Gregersen (1987). "Incentives for Tree Growing in Relation to Deforestation and the Fuelwood crisis in Central America", Centro Agronómico Tropical de Investigación y Enseñanza, CATIE, Department of Natural Renewable Resources, Turrialba, Costa Rica .

[2] PAFC (1994) Plan de Acción Forestal para Chile, Ministerio de Agricultura.

[3] For example, the removal of market distortions that have favored agricultural products in the past, can increase the interest in reforestation without the help of financial incentives.

[4] According to these policies, governments have are implementing five main reforms: 1) the elimination of all tariff barriers to international trade, 2) the maintaining of a true market exchange rate of their currencies, 3) the reduction of state expenditure, including the decrease or elimination of subsidies, 4) the reduction of direct state involvement in economic production, and 5) the promotion of exports of primary products in order to service their debts and pay for imports.

[5] Stewart, R. and D. Gibson (1994). "Environmental and Economic Development Consequences of Forest and Agricultural Sector Policies in Latin America", paper presented at the workshop on Reform of Government Policies Related to the Conservation and Management of Forest Resources in Latin America sponsored by the IBRD, IDB, USAID, IICA, and CIFOR, Washington, D.C.

and non-tariff barriers to the trade of forest products, 2) the removal of the export ban on all products of species not in danger of extinction, 3) the elimination of all consumption taxes, other than the general sales tax, and 4) existence of adequate financing for research and extension service organizations targeting both natural and plantation forest management.

The above arguments illustrate the controversy and uncertainty surrounding the application of subsidies for industrial forest plantations in Latin America. The Inter-American Development Bank (IDB) and other agencies have received requests to finance industrial plantations that are the object of government financial incentives. Taking into account these requests, on January 19 1995, the Environment Division (ENV) of the Social Programs and Sustainable Development Department, and the Environment and Natural Resources Management Division (EN3) of the Regional Operations Department III arranged a one day workshop to contribute to the decision making process regarding the financial support of subsidy-type incentives for industrial forest plantations in Latin America. Mr. Kari Keipi (Senior Forester, ENV) was the moderator and Mr. Flavio Bazán (Financial and Institutional Specialist, EN3) made the initial remarks of the workshop. The objectives of the workshop were to:

Exchange of ideas among workshop speakers and participants regarding the relevance of financial incentives for industrial forest plantations, and;

Develop recommendations for the use of financial incentives in the operations the Inter-American Development Bank (IDB) and the generation of a document of proceedings based on the workshop.

A total of 21 people participated in the workshop, four from universities and non-governmental organizations (NGOs), two from the World Bank, fourteen from the IDB and one from a consulting firm. In the morning and part of the afternoon, presentations were given by experts from the IDB, Jaakko Poyry Consulting (UK), Ohio State University and the World Bank, followed by discussion. Some points analyzed by the experts included the economic conditions for the development of industrial forest plantations, experiences with the implementation of forest incentives in Argentina and Chile, and the analysis of a potential program of subsidies in the economic, political, environmental, social and institutional setting of Ecuador. In the rest of the afternoon, three groups were organized to discuss the following issues:

Is the use of financial incentives justified for industrial plantations in Latin America, given the current policy reforms that remove market distortions? Under what circumstances may the incentives be justified?

Should the IDB get involved in the financing of industrial plantation programs that are receiving financial incentives from the government?

The participants evaluated the workshop favorably (see Annex 3). The relevance of the topic, the diverse backgrounds of the participants, and an interesting organizational approach, all contributed to a lively exchange of views and ideas.

Conclusions and Recommendations

A consensus among most of those present was reached that led to several conclusions and recommendations.[6]

Conditions for Successful Industrial Plantations

In Latin America, not all countries possess the comparative advantages that warrant large scale industrial forest production. Some of the countries that are implementing such plantation programs are Argentina, Brazil, Chile, Uruguay and Venezuela. In most of these cases, the driving force for industrial forestry has been the establishment of private tree plantations with government participation, at least in the initial phase.

The most important factors affecting the interest of the private sector to plant trees have been high stumpage prices that result from competitiveness in the market place, and stable political and economic conditions that minimize risks, especially those related to the long investment period.

Many Latin American countries are currently carrying out macroeconomic and sectoral policy reforms, especially by removing agricultural subsidies. Elimination of these subsidies may indirectly encourage private sector investments in tree plantations. The current institutional reforms may result in less government interference and control of industrial plantations. However, many countries still lack some of the political, macroeconomic, institutional, technical, financial, and social conditions required to guarantee the success of a program of financial incentives for industrial forest plantations.

The likelihood of success of any investment operation that uses forest plantation incentives will increase if several important pre-condition are satisfied, such as having a high quality human capital base, a forest research system that promotes the study of both native and exotic species and ecosystems in plantations, an efficient forest extension system, and institutions with a high management and regulatory capacity in the forestry sector.

The impacts of industrial forest plantations on the remaining natural forests, agroforestry and social forestry investments with potentially important social and environmental effects have to be analyzed.

Use of Incentives to Finance Private Forest Plantations

National policy formulation on incentives and forest conservation and development in general, should result from the involvement of all major interest groups in decision making, including the government, local communities and their organizations, private sector firms, and NGOs. Ultimately, the decision of a country to use incentive schemes for industrial plantations in the private sector is a matter of its sovereignty over its natural resources.

Subsidy-type incentives have been applied because they compensate for the high risk of industrial forest plantation investments. Additionally, subsidies can contribute to the establishment of an initial mass of plantations in order facilitate financially sustainable forestry and foster forest industry development. However, on a cautionary note, the establishment of a program of subsidies for industrial plantations in any country can constitute a precedent for granting subsidies in other sectors of the economy. The impact of possible

[6] See Annex 3 for some post-workshop reflections and opinions submitted by several participants.

distortions by potential incentives to the general economic and financial policies of the country should be minimized.

One of the likely effects of macroeconomic, political and institutional reforms that most countries are implementing will be to provide the private sector with the conditions required to implement industrial forest plantations, without the support of subsidies. This thesis, however, still has to be tested in many countries before these incentives are totally abolished. It is important to consider that there is no guarantee that such reforms will provide the ideal conditions for the generation of social and environmental externalities from forest investments.

In watershed management progroams, where one of the prime objectives is to encourage the adoption of more sustainable agricultural practices, financial incentives should be targeted and temporary. **Targeted** means that producers should only be offered enough money to cover their marginal cost of adoption. Producers with the lowest adoption costs and the highest benefits should be given priority over producers where the two are nearly equal. **Temporary** means that subsidies should be paid on a one-time basis to prevent any relationship of dependency between the government and the beneficiary, give the assumption that the recommended practices eventually will be more profitable to the farmer than current methods and produce downstream environmental benefits as well (a "win-win" situation).

Subsidizing on the basis of marginal adoption cost (targeting) is a principle that carries over from watershed management to the case of industrial forest plantations, as does the temporary nature of subsidies, if the objective is to encourage a promising infant industry to grow. However, if the main objective of public financial support to forest plantations is to "contract" with the private sector to provide positive environmental externality services that would not be generated otherwise, it may be necessary to maintain the subsidy in perpetuity.

Targeting in the sense used above should not be confused with the use of social criteria for choosing low income groups when such targeting is carried out. The effectiveness of forestry investments in reducing rural poverty should be evaluated relative to other possible programs, perhaps in other sectors.

When incentives are considered necessary they should be implemented efficiently so that the end result is establishment of the desired plantations at least cost with the desired economic, environmental, social and technical characteristics.

The justification of investment projects that involve the use of financial incentives has to be made mainly with economic arguments based on social and environmental benefits such as the recovery of eroded lands, the sequestration of atmospheric carbon, and the reduction in pressure by the forest industry and small producers to exploit native forests. Therefore, possible government participation in the financing of plantations should be based on assessed market and non-market benefits. If such participation is established, a cost recovery mechanism must be contemplated.

IDB Involvement in Financing Plantations

The IDB and other international organizations only should participate in the financing of industrial forest plantation programs after a careful economic, technical, financial, environmental, social and institutional evaluation of these programs. It is also important to analyze the potential risks related to their implementation.

The willingness of the Bank to provide funding would depend also on the results of the analysis of the global

environmental and social benefits, according to the principles set out in the document of the Eighth General Increase in the Financial Resources of the IDB approved in 1994.

During the preparation of industrial forest plantation investments for IDB consideration, the design of possible public/private financing schemes should include inputs from government, affected local communities and their organizations, the private sector, and NGOs.

Presentations

An Preview of the Presentations: Principal Issues[7]

The texts of the presentations that follow deal with seven important issues related to subsidies for industrial forest plantations.

Social, political and economic reforms can alter the setting for forest investments and the use of financial incentive programs. Gabriel Montes and Douglas Southgate pose the economic and social problems caused by previous policies implemented in Ecuador, and discuss the framework of reform that is beginning to be undertaken at the national level, thereby establishing an appropriate introduction to the subsequent analysis of the applicability of industrial forest subsidies.

The social, political and economic conditions necessary to ensure the success of industrial forest plantations. Olli Haltia identifies seven fundamental economic conditions related to the development of forest plantations. Luis Constantino and William Beattie review the key social and economic factors that, beginning with forest plantations, stimulated the forest industry in Chile.

The main characteristics of a successful program of financial incentives for industrial forest plantations. William Beattie summarizes the characteristics and success indicators of the Chilean subsidies program. Mario Niklitschek also discusses the Chilean case, but from a more theoretical standpoint, analyzing the role of economic incentives in promoting forest management that takes environmental externalities into account. William J. Vaughan, in presenting the results of Professor Darrell Hueth's work for the IDB, highlights the main features needed for a successful incentives program in upland watersheds; some of these are also applicable to industrial forest plantation case.

Criticisms of financial incentives for industrial forest plantations. William Beatty summarizes the main points of opposition to the Chilean subsidies program and explains the reasons why the program has become less popular in recent years.

Countries not meeting the prerequisites that facilitated the successful use of incentives in Chile could have difficulties in successfully emulating that program. Douglas Southgate sets out the reasons why application of a subsidy program like Chile's could run into serious difficulties in other countries, using Ecuador as an example.

Environmental arguments might justify a financial incentives program for forest plantations. Luis Constantino justifies incentives for forest plantations using environmental arguments. In the case of a plantation project under preparation in Argentina, the carbon sequestration function of the trees would contribute to reducing the global warming effect. Similarly, in Ecuador, part of the plantation could be set aside for carbon sequestration while the other part is utilized for industrial ends.

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[7] Of the presentations in this section, three are based on texts supplied by the authors (Montes, Haltia, and Vaughan). The remarks by Constantino, Southgate and Beattie were not supplied in complete manuscript form; they were reconstituted from tape recordings of the sessions, supplemented by some materials supplied by the presenters. Mario Niklitschek attended the workshop, but did not make an oral presentation. His valuable work only came to the attention of the organizers after the event, and is included here because of its contribution to clarifying the general issues and its obvious importance to the debate.

Agricultural Sector Program and Renewable Resource Management in Ecuador

Gabriel Montes, Inter-American Development Bank.[8]

Summary: *This paper offers an analysis of the major problems that exist in the agricultural sector and looks at the components of the agricultural sector program that the IDB plans to support in Ecuador. Import substitution policies, state intervention on prices and trade, the weakening of institutions and of natural resource property rights, are but a few of the factors that have contributed to poor natural resource management strategies in Ecuador. In order to eliminate these tendencies, the IDB's agricultural sector program has proposed to take action in the following areas: 1) Agricultural public sector reform, involving restructuring of the Ministry of Agriculture and of other institutions responsible for renewable resource management; 2) Opening agricultural input and product markets through strengthening water and land property rights; 3) Decreasing state intervention in agricultural production and marketing, and; 4) Changing price and external trade policies.*

I. Introduction

Macroeconomic policies, especially import substitution, have greatly influenced the evolution of the agricultural sector. It has been affected by several product import and export restrictions including prohibitions, licenses, and export tariffs, all of which distort the allocation of productive resources.

Within the sector, the policy has been dominated by state intervention in the market, via subsidies implemented through lending institutions, and via distortions that have dominated the important land and water markets.

Distortions in relative prices caused by general and sector policies, weakening of property rights in principal resources, public fund diversion towards inefficient activities, and the weakening and bureaucratization of sectorial institutions have limited the possibility of agricultural growth in Ecuador and have led to the inefficient exploitation of natural resources in the country.

The Ley de Reforma Agraria and the Ley de Colonización y Areas Baldias included dispositions that, when requiring the substantial agricultural exploitation of a parcel, had the effect of destroying the forest resources before the awarding of property rights.

Through the Ley de Aguas, issued in 1972, Ecuador nationalized its hydraulic resource management. The State, however, has administrated and regulated hydraulic resources poorly.

In the 1970s the Ministerio de Agricultura y Ganaderia (MAG) developed a complex structure for direct state intervention in the agricultural activities of production and marketing, which, despite its abundant use of resources, only benefitted a limited number of farmers.

INEFAN is the entity in charge of forest conservation and use in protected natural sites and in forest life; this institution was founded by Law 08 in September of 1992. Its principal functions are: (i) delimit and administer all public forest and natural forest areas; (ii) supervise the reasonable conservation and utilization of forest resources; (iii) promote and coordinate scientific research within its field of knowledge.

[8] Translated from the original in Spanish. Errors in the translation are not the responsibility of the author.

II. Program Goals and Description

The Sectorial Program's main goal is to make Ecuador's agricultural sector rationalize the use of productive resources, to adequately use its potential for growth and to contribute to an improvement in the standard of living of low-income people.

The proposed program contemplates action in the following areas: (i) liberalization of input and output markets, through the strengthening of productive resource property rights, reduced state intervention in agricultural production and commerce and modification of price and external trade policies; (ii) reorganization of the agricultural public sector, including the restructuring of the Ministry of Agriculture (MAG), to make it a normative entity undertaking only a restricted number of essential functions; (iii) the reorientation of fiscal support toward the above aims; (iv) the reform of irrigation policy and hydric resource management (v) general policy changes and institutional strengthening in matters of renewable natural resources, in order to promote sustainable development.

Actions to be taken regarding renewable natural resources are explained below.

A. Land Markets

The goal is to guarantee property rights and make open and smooth land market operation possible. With that objective in mind, the Program will implement the following: (i) regulation and application of the Ley de Desarrollo Agrario, recently issued by Congress, which modifies the Ley de Reforma Agraria, to guarantee the security of land ownership and eliminate uncertainty regarding tenure; implement legal changes which will allow both cooperatives and communes to select their preferred model of land exploitation; take the appropriate measures to allow for any legal or natural individual to own land, and grant free exchange of lease, mortgage or division of land by removing IERAC intervention in such transactions; (ii) as a consequence, this Law redefines IERAC's (now called El Instituto de Desarrollo Agropecuario INDA) functions to specialize in aspects of land titling, which by definition can only be temporary, and require a reduced staff.

B. Water Legislation

The Ley Agraria project, presented to Congress by the Government, incorporated general principles of water management through the following dispositions: (i) creation of indefinite and freely transferrable water exploitation rights; the Law had to approve the rights of those individuals currently holding a valid permit for the use of water; (ii) the registration of these rights in the regional property records and in the records of the governing body of the country's hydraulic resources; (iii) regional and municipal authorities could use the extracted water for domestic and sanitary purposes if they pay compensation to present users; (iv) obligation to control water quality and sanction those activities leading to its contamination.

However, the Ley de Desarrollo Agrario (Agicultural Development Law) approved by Congress partially modified these principles. Even though it allows the transfer of water rights, they must be attached to the simultaneous sale of land and must be authorized by INHERI.

Consequently, the IDB and the Ecuadorian Government will have to agree on the terms by which such a project (Ley de Aguas) will be prepared, approved and regulated to attain these general principles and comply

with the following provisions:

(i) specify arrangements on exploitation rights, their initial distribution and their mode of acquisition; (ii)the creation of a National Authority of Water Control/management and supporting technical institutions necessary for resource management and conflict resolution; (iii) the development of stipulations that assure sustainable resource management and avoid monopoly practices in the market; (iv) resource management decentralization, including the creation of necessary regional entities, and transferring resource administration back to the users; (v) mechanisms on cost recovery and financing integrated management of the watershed by the users.

C. Irrigation Management

In addition, the Program looks at a series of measures concerning irrigation, including:

a. Institutional changes including: i) reform of the Instituto Ecuatoriano de Recursos Hidráulicos; ii) organization of regional entities according to specific watersheds, plus the creation of necessary institutions for North and Central Ecuador, based on the application of existing mandates; iii) allow users' associations to manage, operate and maintain irrigation districts.

b. Development of cost recovery plans, in existing as well as in new projects. For it to take effect, a tariff system will be established that is based on the following principles : (i) the tariff must cover at least operation and maintenance costs of all projects, eliminating distinctions among user categories. For existing projects, it has to be decided where partial or full cost recovery can be implemented; (ii) In new projects, policies will be studied that would enable substantial cost recovery, along with participation of potential users in the decision-making process.

D. Renewable Natural Resources

Here, the aim is to assure the rational utilization of renewable natural resources and sustainable rates of growth in output over the short and long run. This could be achieved through:

a. The formulation of a recovery policy for deteriorated areas, assisting the government in carrying out the studies leading to the financing of specific watershed management plans.

b. Introducing institutional changes necessary to strengthen renewable natural resource management, monitoring and assessment including: (i) establishing and strengthening the national normative functions in the Ministry of Agriculture over the sector's natural resources and rural environment in general, (ii) assigning institutional responsibilities, within new and existing entities (iii) formulating a strategy for managerial and technical improvement of those entities responsible for resource management.

III. Impacts of Sector Measures

A. Sustainable Soil Management

The provisions of the Ley de Desarrollo Agrario generally tend to promote more rational soil management. The reduction of uncertainties about land tenure and the elimination of barriers to land market transactions will tend to increase the market value of farms, and facilitate access to financial markets. Therefore, private benefits and possibilities of erosion control investments will increase.

B. Disincentives to the Use of Fragile Environments

The Ley de Desarrollo Agrario eliminated certain requirements of the older Ley de Reforma Agraria; specifically the need partially clear the land to establish legal ownership. Likewise, it eliminated certain incentives contemplated in the Ley de Colonización y Areas Baldías. Additionally, the Law contains several dispositions that encourage the sustainable management of renewable natural resources: (i) the land is considered to fulfill its social function whenever it is productive and its natural resources are adequately preserved; (ii) the leveling of land is not considered as cultivation; (iii) practices that illegally damage renewable natural resources are considered cause for expropriation.

C. Sustainable and Efficient Water Use

The Ley de Desarrollo Agrario established transferrable rights for water utilization, subject to the parcel's simultaneous transfer and to authorization by INHERI. Likewise, the Law compelled urban users to compensate the farmers, whenever the latter's utilization rights were affected. Although these reforms partially respond to the program's requirements they will have the following effects: (i) increase in the price of water, which will discourage its use for water-intensive crops and irrigated crops on marginal lands; (ii) increase the demand for higher water quality; (iii) increase water availability for other uses; (iv) stimulate more private investments to increase supply, thereby freeing up public resources for conservation activities; (v) increase smallholders' assets, consequently improving their access to the financial system.

D. Irrigation Investment Rationalization.

The Ley de Aguas project, included in the Program for the operation's second tranche, includes: (i) the establishment of a Autoridad Nacional de Aguas, which will dictate norms for the allocation of water among sectors, assess the environmental and economic rationale of projects, and establish a means for conflict resolution; (ii) establishment of an adequate cost recovery system for water projects, thus encouraging its efficient use; (iii) transferring administration and operation back to the users; (iv) Definition of practices that contribute to the resource's sustainable and integrated management; (v) the formulation of mechanisms to finance watershed management.

E. Formulation of a Policy for Watershed Management.

Through the provisions of the Ley de Aguas and the technical cooperation, the Program will contribute to the formulation of policies for watershed management and recovery of degraded lands. The policies will include:

(i) the identification of national priorities in watershed management; (ii) the establishment of guidelines for the development of land and water conservation projects; (iii) the design of financing mechanisms for watershed management and the allocation of national and international funds for that purpose.

F. Forest Administration Improvement.

Through technical assistance, the Program will contribute to the formulation of criteria for the review and approval of forest management plans; the definition of responsibilities between the INDA and the INEFAN regarding the private sector's access to forest lands; the development of model contracts with the private sector; and the outline of a work plan on technology transfer and research in forest matters.

{PRIVATE }Industrial Forest Plantations as a Priority Area - A Social Economic Framework {tc \l 3 "Industrial Forest Plantations as a Priority Area - A Social Economic Framework "}

Olli Haltia, Jaakko Poyry Consulting (UK).

Summary: *This paper offers an analysis of economic conditions for industrial forest plantation development. Comparative advantages are considered to be basic macroeconomic conditions favoring/facilitating Sector development (Condition 1). The rate of return of foreign forest investments is potentially worthwhile if discounted benefits exceed discounted costs (Condition 2). Afforestation is justifiable if the net benefits of plantation forestry exceed the discounted net benefits of the next best use of land (Condition 3). The external effects must be correctly identified (Condition 4). The stabilization of macropolicies increases private profitability of forest investments (Condition 5). The establishment of correct stumpage prices is essential to direct forest sector development (Condition 6). The social returns should be measured and evaluated using correct shadow prices and taking into account the values of the non-market externalities (Condition 7).*

I. Comparative Advantage

Condition 1:

$F/F_w > L/L_w$ and

$F/F_w > K/K_w$

Where:

K=Capital
L=Labor
F=Land
w=world

According to economic logic, it makes sense for a country to specialize to production of the commodity which uses intensively its relatively abundant factor. A country endowed with land suitable for forestry, capital and labor is said to be relatively abundant in the land suitable for forestry if its share of the world's forestry land exceeds its share of the world's labor force and capital.

If certain preconditions are fulfilled (such as availability of capital and information etc.) market forces could be expected to lead to optimal allocation of resources following the principles of comparative advantage. Due to market failures the preconditions may not be met and it would be the role of the public sector to re-establish the markets guided by economic principles.

II. The Social Rate of Return From Plantation Investments

2.1 Principles

Condition 2:

$\Sigma_t \beta^t B_t > \Sigma_t \beta^t C_t$

Where:

B=Benefits
C=Costs
β^t=Discounting factor

The rate of return on afforestation investments is determined by benefits and costs of afforestation including all measurable market and non-market values. The forest investment is judged potentially worthwhile if discounted benefits exceed discounted costs.

Condition 3:

$$\sum_t \beta^t (B_t - C_t) > \sum_t \beta^t (B_{at} - C_{at})$$

Where:

a=alternative land use.

On the other hand, the land which is considered to be suitable for tree planting may have alternative uses, e.g. agriculture. The Cost-Benefit approach justifies afforestation if the discounted net benefits of plantation forestry exceed the discounted net benefits of the next best use of land.

Notice that condition 3 also acts as a criteria for choices between different tree species.

2.2 Benefits and Costs of Afforestation

The planting of forests produces a number of joint outputs and services. While forest products (mostly timber) is exchanged in the market place at market prices, many of the other services have to be considered as non-market and public goods for which market prices do not exist. The benefits of plantation forestry include at least the following:

- Timber and other forest products value
- Preservation and recreational value
- Landscape value
- Biodiversity value
- Watershed protection
- Microclimate improvement
- Air pollution value
- Water pollution value
- "Greenhouse" benefit
- Economic security
- Community integrity.

The costs of afforestation include land acquisition costs, planting costs, maintenance and possibly environmental costs.

Condition 4:

The external effects are correctly identified.

The existence of the multiple benefits and costs requires their proper evaluation in order to establish the social rate of return.

III. Time and Risk

For many public investment projects, it is reasonable to assume that the costs and benefits accruing to taxpayers have no risk cost and should therefore be discounted at the risk-free rate of time preference. There are definite similarities between public and forest investments: due to the wide basket of outputs produced, the forest investments benefit the whole society, not only the forest investor. However, the forest investment is often an action of a private forest owner who bears at least part of the costs herself and cannot share the (total) risk with the rest of the society.

Condition 5:

Stabilization of macro policies.

The required risk premium is affected by the long maturity time of forest investments. The risk premium can be decreased by implementing the above condition.

IV. On the Valuation of Benefits and Costs

Condition 7:

The social returns should be measured and evaluated using correct shadow prices and taking into account the values of the non-market externalities.

A. Timber

Condition 6:

Establish correct stumpage prices according to the market conditions.

Stumpage income is the major source of revenue for most forest investors. Timber prices signal the relative scarcity of wood and should coordinate the forest sector development.

B. Preservation and Recreation

The valuation of recreation and preservation is usually based on 'willingness-to-pay' estimates. These typically vary depending on species and the distance of the forest from urban centers.

As an example of temperate zone plantation forestry, it has been found that values in the following range would be justified for Ireland:

- £361ha/a for Sitka spruce
- £150/ha/a for Sycamore
- £220/ha/a for Oak

C. Carbon

Trees take carbon dioxide from the atmosphere and fix it in wood tissue. Depending on use of wood, the fixed carbon is eventually released in the form of $C0_2$ in varying degrees; e.g. burning wood would result in sudden emission of carbon whereas in construction wood carbon would be "locked up" for a relatively long period.

Based on a wide range of studies, it can be estimated that each forest hectare in temperate zone represents, depending on species distribution, a carbon storage of 15-30 t/ha as an average figure for a long time period, 100 years or so. Thus, using a damage cost estimate of £14.5/t of carbon, the carbon fixing value can be estimated at £200-435/ha.

D. Labor

Afforestation tends to take place in rural areas where alternative employment outlets are few. Rural unemployment and movement of rural population to urban areas would suggest that the opportunity cost for forestry labor is lower than the wage rates actually paid. For example, in the UK the shadow wage rate often used is 67% of the market wage.

E. Land

The national economic value of land asset should reflect to its economic productivity in alternative use. However, in many countries the land prices are distorted by the support of Agricultural Policies. For example, in the UK it has been estimated that if all subsidies would be removed, agricultural land prices might fall as much as 46%. This suggests that the national economic land price would be 54% of the market price and that land acquisitions for afforestation should be valued according to this. On the other hand, it is obvious that the land opportunity cost for afforestation on some sites would be zero if there is no agricultural activity.

{PRIVATE }Subsidized Tree Plantations in Ecuador: Some Issues {tc \l 3 "Subsidized Tree Plantations in Ecuador\: Some Issues "}

Douglas Southgate, Ohio State University

Summary: *This paper reviews macroeconomic factors that affect the wood products sector and offers an analysis of the Ecuadorian forest subsidy scheme's main traits. The import substitution and industrialization strategy has had a negative impact on the Ecuadorian rural economy. Investments in productivity enhancement and human capital formation have decreased considerably and most institutions lack suitable infrastructures. Likewise, a long term financing system is needed in the wood products sector. In an attempt to overcome these problems, farmers opt for converting forest into low grade farmland, which turns out to be the best alternative (when it comes to their livelihood). The Instituto Ecuatoriano Forestal y de Areas Naturales y Vida Silvestre (INEFAN) implemented the Plan Maestro de Forestación (PLANFOR) in order to overcome the abovementioned problems and counteract negative impacts on wood production caused by deforestation. This program calls for planting trees on 100,000 hectares during the next four years and on 600,000 hectares during the next two decades. Moreover, PLANFOR expects to create new jobs for 50,000 people and eliminate the country's trade deficit in wood products. Nevertheless, to make sure that PLANFOR will be successful in obtaining these benefits, the government must compare the anticipated benefits of reforestation with the returns to alternative public investments. Ecuador must improve its forestry situation by attracting foreign investment, strengthening the human capital base and promoting local forestry research, among other measures.*

I. Dimensions

Ecuador does have a serious deforestation problem. According to INEFAN, 100.000 to 150.000 ha. are been converted each year into cropland and pasture. About 80% of the deforested land is used for livestock production in a very extensive way. During the 1980s cropland and pasture were expanding at a rate of 2% per year. This was the second highest relative rate in Latin America. Only Surinam had a larger relative rate.

II. Environmental Impacts

The main impacts of deforestation are:

A. There is a biodiversity loss. In Ecuador there are more bird species than the continental United States and there is an ongoing process of extinction of these species due to habitat loss.

B. There is increase sedimentation and flooding.

C. There are climatic impacts at a local level and potentially at a global level. As carbon is released in the atmosphere the greenhouse effect is exacerbated.

D. Production forestry opportunities are being missed.

III. Causes

The macroeconomic and sectoral policies tend to discriminate against the rural economy. Currency overvaluation, price controls and other policies were pursued as part of an import substitution and industrialization strategy of development. Furthermore, productivity enhancing investments were not

encouraged in the countryside and ties between economic activity and renewable resource mining were strengthened.

No productivity enhancing investment is more important than human capital formation. In the last twenty years, Ecuador has made great progress in terms of human capital formation especially in population centers. But there is still a large population of poor peasants for whom converting forest into low grade farmland is the best alternative. Unless this problem is addressed no park protection initiative, no forestry sustainable development scheme is probably going to be effective in saving natural habitats.

In addition to the general discrimination against economic activity in the countryside, there has been discrimination specifically against forestry. The log export ban was not a conservation measure. It was put in place as part of an import substitution and industrialization strategy, and to keep raw material prices low for the wood product sector. One example of the impact of this policy is that not even round wood of exotic species like Eucalyptus was allowed to be exported. In the late 1980s, an Italian firm was trying to buy Eucalyptus. A foreign species that is in no risk of extinction. There is no conservation reason to control the trade of Eucalyptus logs. Nevertheless, the government of Ecuador tried to stop the trade.

Another problem of forestry is the lack of long term capital. This is a consequence of chronic inflation and the lack of and institutional infrastructure, including property rights, and modern registers necessary to have an efficient credit system working in the country site.

Finally, there is the problem of environmental externalities. This is the reason why people have chosen to convert forested land, which yields various environmental values, into low grade cropland and pasture.

IV. Rationales for Financial Incentives

A. Paying for Environmental Externalities

Tree plantations sequester carbon and can harbor wildlife. Although floral biodiversity is low in many reforested areas, an increase in timber supply from plantations can ease logging pressure in places where endangered plants are found. In addition, planting trees can reduce downstream sedimentation and flooding.

Assigning economic values to these and other positive environmental impacts is difficult. Estimating downstream benefits requires that the movement of water and sediments through a drainage basin be modeled as well as knowledge of the economic damages associated with sedimentation, flooding, and so forth. There exist estimates of per capita willingness-to-pay for individual species and for preservation of all the world's tropical rainforests. But these estimates do not comprise a satisfactory basis for evaluating the value of biodiversity at any given site. Roger Sedjo and David Simpson, of Resources for the Future, are examining the value of wild genetic material used in biomedical research and development. Although tentative, their findings suggest that value is often quite low. Evaluating carbon sequestration seems to be more tractable. An upper-bound estimate of the benefits of preventing carbon from escaping into the atmosphere (e.g., by running an engine more efficiently or by planting trees) is the tax that some countries currently impose on emissions. For example, the tax in Norway is some $150/ton at current exchange rates. By contrast, Yale University's William Nordhaus estimates that the damages associated with carbon emissions currently amount to $5/ton and are climbing steadily (J. Econ. Perspectives, 7:4, Fall 1993).

Insofar as environmental impacts can be expressed in monetary terms, efficient subsidies for activities, like tree

planting, that result in positive externalities can be determined. Better still, though, would be the establishment of a mechanism that would give economic agents facing restrictions or taxes on carbon emissions the option of paying somebody else (e.g., owners of land suitable for reforestation) to sequester carbon.

B. Stimulating the Wood Products Sector

Entirely distinct from the environmental rationale for subsidizing tree-planting is the argument that financial support is needed to get the wood products sector off the ground. In Ecuador, as in other places, the argument is made that forest subsidies would create jobs, decrease imports, boost exports, and cause the economy to grow. In its Plan Maestro de Forestación (PLANFOR[9]), issued in May 1993, the Instituto Ecuatoriano Forestal y de Areas Naturales y Vida Silvestre (INEFAN) called for planting trees on 100,000 hectares during the next four years and on 600,000 hectares during the next two decades. The costs of planting and initial maintenance, which the government would cofinance, average $300/hectare. The claim was made that implementing PLANFOR would eliminate the country's trade deficit in wood products, which has to do mainly with imports of pulp and paper and, according to the FAO, currently amounts to $130 million per annum. Domestic fuelwood supplies would be increased. In addition, tree-planting and management of the new forest would employ 50,000 people directly and create a larger number of jobs indirectly.

To be sure, the anticipated benefits of reforestation should be compared with the returns to alternative public investments. Although this sort of analysis has not been conducted yet, PLANFOR's advocates have been quick to cite the success of the Chilean forest incentive program that INEFAN used as a model when designing its scheme. Since Law D.L. 701 passed in 1974, tree plantations in Chile have expanded to some 1.6 million hectares and currently provide more than 95 percent of the country's timber supplies. Having grown by 5 percent per annum during the last 15 years, the wood products sector now produces 3.1 percent ($2.2 billion) of Chile's GDP and 9 percent of its exports. These benefits exceed by a wide margin the $70 million in reforestation subsidies paid out during the past twenty years.

It is generally agreed that governmental payments for planting and initial maintenance contributed substantially to the emergence of the wood products sector as a major player in the Chilean economy. However, it is important to remember that a series of prerequisites for rapid forestry development have been in place since the passage of Law P.L. 701.

- Macroeconomic and trade policies have not depressed stumpage values, unlike what has occurred in many other countries.

- Species, like Caribbean pine, are well-known and easy to manage technically.

- The human capital base has been in place. For example, the graduates of Chile's four university forestry faculties are, for the most part, highly qualified.

The relative contribution that these factors and Law P.L. 701 have made to the rise of Chilean forestry merits careful examination. Without a doubt, efficient markets for timber, the ready availability of suitable species, and the presence of a qualified work-force were all necessary conditions for expansion of the wood products sector. Had any of these prerequisites not been satisfied, the response to subsidies for planting and initial

[9] PLANFOR is a response to deforestation and its causes, and it has been justified on productive, environmental, and economic grounds.

maintenance would have been much more limited.

V. The Situation in Ecuador

Although Chilean and other consultants called into Ecuador have stressed that all impediments to forestry development be addressed in an integrated fashion, INEFAN has made subsidies the centerpiece of its reforestation initiative.

The unavailability of long-term credit in Ecuador, which has much to do with chronic inflation, greatly discourages tree-planting and forest management in the country. But even if that problem were solved, landowners do not face strong incentives to reforest.

• Stumpage values remain low, largely because of policies (e.g., a prohibition on the export of unprocessed logs) that have turned the Ecuadorian timber market into an oligopsony.
Although those policies are being reformed, the buying and selling of timber remains uncompetitive in many places. Also, there are severe bottlenecks in marketing and processing, which depress residual raw material values.

• Technical support for establishing and managing tree plantations is weak. Outside of limited efforts by the Fundación Durini, which is affiliated with ENDESA/BOTROSA (Ecuador's leading wood products enterprise), there is little forestry research in Ecuador. For all intents and purposes, forestry extension does not exist. A few lowland species (laurel, pachaco, teak, balsa, sande, and virola) show promise, but pest control and other management problems still remain largely unresolved. Pine plantations in the Andes usually suffer from failures of adequate management (i.e., thinning and pruning).

• The wood products sector's human capital base is weak. There are few bright spots among Ecuador's five or six university forestry faculties. Before enrollment of approximately 30 individuals in a two-year course offered at INEFAN's Conocoto facility, just outside Quito, no technician had been trained in the country since an FAO-supported effort came to an end, in the early 1970s.

Furthermore, PLANFOR is not proving to be an effective mechanism for financing tree-planting.

• Prospective beneficiaries incur major transactions costs, since clear lien-free title must be demonstrated and a planting and management plan must be prepared and submitted.

• The inspections and paperwork involved in PLANFOR are likewise putting a considerable strain on INEFAN's limited administrative resources. Virtually every part of the institute is involved since PLANFOR is not focused on those parts of the country where prospects for forestry development are especially promising (see next section). Anecdotal evidence suggests that PLANFOR is diverting resources away from agroforestry promotion, park management, and other activities for which INEFAN is responsible.

INEFAN reports that trees have been planted on 23,000 hectares since the current administration took office, in August 1992. Industry sources speculate that PLANFOR subsidies have not been applied in 75 percent of that area. Aside from wood products firms interested in establishing reliable supplies close to veneer plants and other processing facilities, interest in the program seems to be waning. CORMADERA, a non-private forestry concern that sells tree seedlings, reports that few of its clients find it worthwhile to apply for PLANFOR support.

VI. How To Support Ecuadorian Forestry

There are several measures that development agencies and the national government can take to promote expansion of Ecuador's wood products sector.

• Competition in timber markets must be promoted, mainly by attracting foreign investment in production, processing, and marketing.

• Adaptive research aimed at refining management techniques for a few selected species, including laurel, pachaco, teak, balsa, sande, and virola as well as two or three trees that are indigenous to highland Ecuador, should be supported. A board with representatives from the government, the private sector, and the academic community could be set up the awarding of competitive grants for high-priority projects.

• The human capital base has to be strengthened. This will probably involve strengthening some, but not all, of Ecuador's university forestry faculties. Of even greater importance is to expand technical training.

• The allocation of credit for timber production should be streamlined.

Different than the approach taken to date with PLANFOR, forestry promotion measures should have a limited geographic focus. Currently, the most promising area is Northwestern Ecuador.

• Transportation infrastructure, comprising the seaport in Esmeraldas as well as highways and roads (many of which were financed by the IDB), is fair to good.

• A great deal of deforested land is under-utilized, and therefore cheap. Real estate values rarely exceed $1,000/hectare and accessible land can be purchased for as little as $250/hectare.

• Growing conditions are favorable. With a few exceptions, soil erosion has not reached the stage where tree-planting is preempted. Annual precipitation ranges from 2 to 5 meters in most areas considered for plantations.

Initiation of activities in other parts of the country will depend on the availability of financial and human resources as well as favorable market conditions.

Finally, a mechanism for sustainable financing of the educational, scientific, and technical base must be developed. One option would be to levy a modest tax on wood product exports. Another option, which would involve a substantially greater investment in institutional infrastructure, would be to increase real estate taxes. One reason why the latter option is appealing is that a large portion of the gains of forestry sector development can be expected to accrue to landowners in the form of economic rents, which can be taxed with minimal impact on resource allocation.

{PRIVATE }Financial Incentives for Industrial Plantations in Argentina: The World Bank Story {tc \l 3 "Financial Incentives for Industrial Plantations in Argentina\: The World Bank Story "}

Luis Constantino, The World Bank

Summary: *This paper reports on a study carried out by a World Bank mission to support a plantation program with financial incentives in Argentina. Argentina was found to possess seven of the eight factors which had previously been responsible for the growth and success of the forest sector in Chile. Furthermore, a team from Resources for the Future added that one of the most significant benefits of Argentine plantations was carbon sequestration. The World Bank economists confirmed that government would not be interested in loan financing for a project strictly geared towards global benefits (carbon sequestration and exacerbation of the greenhouse effect). Consequently, the project has been reformulated and submitted to the Global Environment Facility for grant financing, were it is now under consideration.*

I. Introduction

About three years ago, the government of Argentina approached the World Bank and requested US$200 million to finance plantations in this country. A mission was sent to Argentina with the idea that the Chilean experience could be replicated in Argentina. The subsidies in Chile promoted a great increase of industrial plantations[10]. Exports of agricultural products in Argentina had decreased, so this would be a good opportunity to shift action to the forestry sector. The mission identified eight main factors responsible for the growth and success of the forest sector in Chile and analyzed their applicability in the case of Argentina:

1. Political stability
2. Macroeconomic stability
3. Liberalization and open foreign investment
4. Regulation of ports, transportation and markets
5. Stable property rights. Land tenure was secure if your property had trees.
6. A credible government with an enforcement capacity
7. Fairly good natural growing conditions
8. Subsidies and tax breaks.

The mission went back to the World Bank and reported that Argentina had a good probability of replicating the Chilean experience because it had seven of the above conditions except for the subsidies and tax breaks. Therefore, they proposed that they should support the Argentina program.

II. Justification

The following two arguments were used to support the plantation program with financial incentives in Argentina.

A. Argentina had a high inflation rate, anarchy in relative prices and very little confidence from private

[10] Today forestry exports in Chile are almost 14% of total exports. Costa Rica, Nicaragua and other countries have been sending missions to Chile in order to propose a system of forest incentives for their countries.

investors. These conditions introduced a bias against long term investments like plantations. This bias could have been removed through the use of incentives. However, at that time the Ministry of Finance had more information about the future governmental plan and their probable impact in the investment scenario than private investors. He knew his own policies and he was sure that he would be successful in implementing stabilization. While the private sector would have to wait ten years before it was convinced by the Ministry. Given this context it made sense for the Argentina government to start the program on forest plantations. But, the World Bank economists responded with subsidy virus argument. This means that if a subsidy is introduced in the forest sector, some time later other sectors such as the fisheries, agriculture, etc, would be asking for subsides. This would jeopardize the macroeconomic program in Argentina. This phenomenon happened in Chile. After the success with the forest subsidy there was an attempt to introduce a subsidy into the fishery sector. The experience shows that once a subsidy is introduced, is very difficult to exclude other sectors from also justifying subsidies.

B. A team from Resources for The Future was sent to Argentina to investigate the environmental externalities of plantations. They identified the following positive and negative externalities:

1.Plantations may be bad for biodiversity in the reforested sites..
2.Plantations are good for carbon sequestration.
3.In certain local circumstances plantations can substitute for consumption of the natural forest and thus contribute indirectly to protect biodiversity.
4.Planting of trees can cause more harm than good at the initial stages of reforestation in disturbing the soils, although in the long run plantations may produce benefits for watershed management.
5.In Patagonia plantations can help slow down desertification. They function as a barrier and control the erosive effect of the wind.
6. Plantations may promote community stability and labor skills.

Following an analysis of the above externalities, it was found that the most significant benefit of plantations was carbon sequestration.

III. The Carbon Sequestration Argument

The World Bank economists expected that governments would not choose to subsidize plantations if their main externality was carbon sequestration. This is a global benefit with minor direct positive impacts for the country. Therefore, it was decided that the project would be part of the domain of the Global Environment Facility (GEF). The original program was reformulated to a US$50 million proposal to finance plantations based on carbon sequestration benefits for the financing of the GEF. Three major issues were faced during the preparation of this new proposal:

A. The idea was not to finance highly productive plantations for fast use. Because if plantations are harvested, carbon is released into the atmosphere exacerbating the greenhouse effect. The objective was to finance non-profitable or marginal plantations that the private sector would not be interested in establishing. The Argentinean Patagonia region was identified as a good place where the marginal plantations could be planted.

B. GEF does not use a discount factor when measuring future environmental benefits such as the reduction of carbon. One ton of carbon released today has the same value than one ton of carbon released in the year 2000. This is the result of the Climate Convention that puts physical targets on carbon sequestration. An implication of the above point is that it may be better to grow species such as sequoias that can accumulate

more carbon in the long run, than the faster growing but shorted lived Eucalyptus.

C. The subsidy mechanism chosen for the Patagonia was based on a bidding game. In this game each producer has to offer a certain amount of land in exchange for a given amount of money and the producer who has the capacity to offer more land for that money gets the financial incentive.

Finally, given the complexity of this project, a more detailed analysis will be carried out on carbon sequestration issues and the amount of subsidies that should be provided to local inhabitants. The project is still under consideration by GEF authorities.

The Forestry Sector Success in Chile

William Beattie, The World Bank

Summary: *This paper enumerates the conditions that contributed to the accelerated growth of forest industries in Chile. It also discusses the major characteristics of the financial incentives program and presents key indicators of the program's success. Furthermore, the criticisms directed towards the program of incentives are summarized, followed by an explanation for its loss of popularity in the past years. The writer concludes that financial incentives have played a central role in reducing investment risks. He also adds that there are few countries in Latin America that possess the necessary conditions to guarantee the success of a financial incentives program such as that of Chile.*

I. Introduction

The excellent result of the Chilean financial incentives for industrial plantations has no precedent in Latin America. Chile's forest plantations cover an area of 1.6 million ha. with a predominance of Pinus Radiata (83.5%) and species of the Eucalyptus genus (10.9%). These plantations constitute the basis of forest industries and exports. In the last 10 years, forest plantations increased at an average of 90,000 ha/year. In 1991, the supply of wood from national forests was estimated 48.3 million cubic meters. In 1992, forests products exports amounted to US% 1,125 million. This success is explained by the policies that have open the economy to international markets.[11]

II. Factors Contributing to Forestry's success in Chile

There are four main reasons that can be attributed to the success of the Chilean forestry sector:

A. Comparative Advantage. Chileans are growing mainly Pinus radiata, which is a fast growing species. The market has been well established and the wood can be produced cheaper than anywhere else in the world.

B. A long forestry tradition. Chile has been in the forestry business for a long time which has given them a good start for the investments.

C. Appropriate technology developed for the Chilean conditions.

D. The institutions are strong. Chile has developed a good group of professionals and they have the ability to administrate the government incentive program efficiently and effectively.

E. Political and economic reforms promoted an adequate scenario for the program of subsidies. Some of these reforms included the reduction of the general controlling role of government, the encouragement of private sector initiatives, and the elimination of most of the trade and investment constraints to the efficient functioning of the private sector.

[11] PACF. 1993. Plan de Accion Forestal para Chile: Memoria Mesa Redonda Internacional. Ministerio de Agricultura.

III. Principal Characteristics of Incentives

The subsidy system in Chile was unique. It was designed for low cost and high quality. Some of the main characteristics of this system were:

A. Forest experts were involved in the design process.

B. The financial incentives program is based on results. The subsidy came after the beneficiaries had already planted the trees. The 75% to 90% reimbursement of the cost was used only for successful plantations.

C. There was a 20 year limit on the program that matches the rotation period of the Pinus radiata. However, this limit has not been met, and the period of the incentives program has been recently extended.

D. There is efficient and flexible administrative control.

IV. Criticisms

After high initial approval, the program of incentives has become subject to several environmental, social, political and economic critiques.

A. Environmental. The establishment of plantations has caused a land use conversion to monoculture and the use of exotic species.

B. Concentration of wealth. Mostly people with an initial capital were able to plant trees. It was more difficult for smaller, uncapitalized firms or persons to be able to participate in the program. The final statistics show that about 80% of the incentives went to the three largest forest companies of the country.

B. Incentives may have been unnecessary because the activity is profitable by itself. However, given the risks of this long term investment, not to many people were willing to put their money into the plantations without an incentive.

C. It was contrary to the philosophy of the government to subsidize. Some economists have argued that with all of the other economic reforms that Chile did, they might have planted the trees without the incentives.

D. The government should not "pick winners" and the selection of sectors of the economy that develop should be governed by market forces. This argument relates to the fact that the government should not have selected the forestry sector (among all of the other sectors of the economy) as the only recipient of the subsidies.

E. Government programs have the tendency of never "dying". The government is having difficulties in eliminating the incentive and even to redirect it for small farmers for planting native rather than exotic species.

V. Indicators of Success of the Program

Some of the main benefits of the plantation program through financial incentives in Chile include:

A. Effective use of money through a low per-hectare cost of plantations.

B. Eroded lands have been rehabilitated and they are producing environmental benefits.

C. Conversion of formerly unproductive lands for economic use.

D. Improving employment in poor rural areas.

E. Due to the incentives, large areas were planted in a short time; incentives were a jump start mechanism for the forestry sector in Chile.

F. Good cost recovery and profitability. According to some studies, there was a 10.5% return on investment to the government in the incentive program.

VI. Decreasing Importance of Incentives

After a strong start, fewer and fewer companies are taking incentives due to the following reasons:

A. Ineligible land. Since the activity is highly profitable, many companies are planting trees also on agricultural lands. Consequently, they do not qualify for the use of subsidies.

B. Reluctance to lock in land use. When Chilean firms plant with incentives they must keep that area perpetually in forest. Many companies do not want to lock in the use of land for forestry.

C. Transport distance. The areas for new plantations on marginal soils tend to be further away from the ports and new plantations are not as profitable as the older ones because they have higher forest product transportation costs.

D. Shift to native forest management. The government wants to provide incentives for managing the native forest.

E. The activity is now mature and self-sustaining financially. The industry does not need more subsidies.

VII. Conclusions

Incentives for plantations have been important because they have compensated the risks originally involved in the investments. Incentives were also necessary to establish a critical mass of plantations in order to have a base on which an industry can be developed. However, there are not too many countries that can comply with all of the institutional reforms and other conditions to justify large scale industrial plantations with or without incentives[12].

[12] The conclusions of this presentation are a personal opinion. It does not present the position of the World Bank.

Incentives for Watershed Management

William J. Vaughan, Inter-American Development Bank.

Summary: *This paper presents the arguments in favor and against subsidies in projects involving the adoption of conservation activities by small farmers participating in watershed management projects. The results of a study carried out for the IDB by Professor Darrell Hueth are remarked upon. The latter evaluates the use of subsidies as an incentive to facilitate agricultural technology transfer and to achieve efficient resource use in upland watersheds. Results from this study suggest that the use of subsidies in watershed development projects are justifiable as long as the available budget is spent to maximum effect by targeting beneficiaries over a limited period of time. That is, producers with the lowest adoption costs and the highest benefits should be given priority over producers whose costs and benefits are more nearly equal, and any subsidies should be temporary. The purpose of subsidies is to bridge the period of net negative farm cash flow period associated with adopting new technologies and thereby stimulate their adoption. Relationships of dependency between beneficiaries and their governments should be avoided.*

I. Introduction

The issue of subsidies is highly controversial. The two following quotations, both by respected economists, give a flavor of views at the polar extremes. The first appeared in a 1987 monograph published by the IDB [13]. It reflects an "old" conventional wisdom in development economics that, since it was written, has been swept away by sector reform initiatives in the region. Its justification for subsidies sounds not unlike the reason juvenile drug offenders give their parents to explain the origin of their addiction: "Everybody does it":

> *Debate over the various arguments about subsidies for forestry investments is not as critical as the recognition that subsidization is already widely accepted and practiced by Latin American governments. Subsidies have become a politically legitimate and accepted tool for promoting investment in forestry and forest industries. (p. 17)*

The "new" conventional wisdom follows the general philosophy of policy reforms the Bank has supported over the past several years. It does not advocate subsidies as corrective measures to offset distortions existing elsewhere in the economy; rather it advocates the direct elimination of those distortions. Rigoberto Stewart, in a presentation made at a forestry workshop just last year[14] succinctly made the case against forestry subsidies in recommending:

- Remove the export ban on all products of species not in danger of extinction.

- Eliminate all tariff and non-tariff barriers to the international trade of forest products and wood processing

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[13] McGaughey, S.E. and H. M. Gregerson. (1987). Investment Policies and Financing Mechanisms for Sustainable Forestry Development. Washington, D.C.: Inter-American Development Bank.

[14] Stewart, R. and D. Gibson, (1994) Environmental and Economic Development Consequences of Forest and Agricultural Sector Policies in Latin America, paper presented at the workshop on Reform of Government Policies Related to the Conservation and Management of Forest Resources in Latin America sponsored by the IBRD, USAID, IICA, and CIFOR, Washington, D.C.

technology.

- Eliminate all export subsidies.

- Remove all consumption taxes other than the general sales tax.

- Establish and fully fund research and extension service organizations targeting both natural and plantation forest management.

- Once these reforms are in place, direct incentives for forestry will be both unwise and unnecessary. Therefore all current subsidy programs -- for reforestation and forest management-- should be eliminated. (Emphasis added)

II. Watershed Management Projects

While watershed management projects are quite different than industrial forest plantations, the issue of whether to subsidize and by how much is common to both. Many of the Bank's watershed projects focus on reducing erosion in upland watersheds by changing the agronomic and agroforestry practices of small growers in these regions. Erosion is considered one of the most important impediments to achieving sustainable production in developing countries. The negative impacts of erosion have been well documented [15] and it is hoped that changing the management practices of small landholders and promoting reforestation projects can significantly reduce the offside costs, and in many cases, increase farm income as well.

In the past a number of direct intervention and incentive type mechanisms have been used to induce growers to adopt proposed management practices. In my own view subsidies can be an insidiously attractive policy instrument that appeals both to borrowers and executing agencies wishing to bestow their clientele with a gift, and to project preparers aiming to generate sizeable loan amounts. Bank economists have frequently expressed similar reservations to me about the justification for subsidization and the size of the subsidy component in watershed projects. The arguments in favor of subsidies given by technical staff in response to my inquiries can be caricatured by the following typical responses:

- Subsidies help keep rural populations down on the farm and relieve urban pressure;

- Rural beneficiaries are poor, therefore they deserve financial help;

- The projects generate downstream (off-farm) environmental benefits and subsidies are needed to assure them.

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[15] See, for example, Anderson, J.R., and Thampapillai J.(1990) Soil Conservation in Developing Countries: Project and Policy Intervention, Washington, D.C.: World Bank; Kaimowitz, D. (1992) La Experiencia de Centro America y la Republica Dominicana con Proyectos de Inversion que Buscan Sostenibilidad en las Laderas. Washington, D.C.: Instituto Interamericano de Cooperación para la Agricultura; Southgate, D. and R. Macke. (1989). The Downstream Benefits of Soil Conservation in Third World Hydroelectric Watersheds, Land Economics 65.1: 38-48; Southgate, D. (1988). The Economics of Land Degradation in the Third World. World Bank, Policy Planning and Research Staff, May; and Veloz, A., Southgate D., F. Hitzhusen, et al. (1985). The Economics of Erosion Control in a Sub-Tropical Watershed: A Dominican Case, Land Economics 61.2: 145-155.

The first two arguments are highly dubious, since there are better ways to achieve income redistribution and labor force allocation objectives than through piecemeal initiatives embodied in individual projects. The third has some merit, and a fourth, often left unsaid by project preparers because it sounds a bit cynical and self-serving, may be, as we shall discuss, the most meritorious of all:

- Subsidies induce higher adoption rates of new, more sustainable agronomic practices and technologies, and thus enhance the chances of ex-post project success.

In late 1993, Professor Darrell Hueth of the University of Maryland was commissioned by the Bank to take a closer, unbiased look at the pros and cons of subsidies for watershed management. The remainder of this presentation summarizes the main findings of his paper "An Evaluation of the Use of Subsidies as a Mechanism to Achieve Efficient Resource Allocation in Upland Watersheds". As its title suggests, the paper evaluates the use of subsidies as an incentive to achieve efficient resource use, and compares and contrasts them to the possibilities for using other instruments. To anticipate Professor Hueth's conclusions, subsidies have a legitimate role to play in facilitating agricultural technology transfer, especially if they are **targeted** to generate the greatest impact from a given pool of public financial resources, and in they are **transitional** or temporary so that an the client does not develop a dependency relationship with government.

A. Conundrum

The economic analysis of our watershed management projects generally suggests that they are both socially and financially profitable, raising the question of why the proposed actions have not been undertaken by small farmers on their own, without the help of government intervention. The reasons are several:

- Insecure land tenure arrangements discourage investments in land conservation and encourage soil mining.

- Imperfections in rural credit markets restrict capital flows for land improvements.

- Risk aversion by the rural poor discourages adoption of more sustainable agricultural practices.

- The negative net cash flows associated with adopting some new agronomic practices discourage farmers, especially in the face of credit constraints.

- Farmers lack knowledge about agronomic practices that would both benefit them directly by raising profits and have positive environmental effects.

While a facile solution would be to address all of these constraints, that is a very long-term proposition. Moreover, the last problem would remain, and it can be addressed immediately through watershed management projects. In fact, a strong justification for watershed projects can be based on the public goods characteristics of information. The results of applied agricultural research and knowledge of new agronomic practices are difficult to appropriate by the private sector and will thus be undersupplied. Government technology development can thus be justified without consideration of negative externality reductions if the net present values of increased producer profits and consumer gains exceeds the costs of these programs[16].

[16] Conceptually there is no reason why some programs developed for producers might not have negative environmental impacts. No till programs for example in some watersheds may yield small external benefits from sediment reduction, but because of the increased complexity of weed and insect pest management problems resulting therefrom can increase pesticide usage, and hence, the net effect may be negative. In what follows, however, it will be assumed that a purpose of the watershed programs is to improve

Moreover, investments that increase the rate of adoption of these programs can yield positive net social benefits.

B. Off-Farm (Downstream) Benefits

In the United States, the bulk of the benefits of watershed management accrue downstream through the positive effects on water quality and reduced sedimentation. The Bank's experience in Latin America suggests that while these externality benefits exist (most often, via the extended life of multipurpose reservoirs downstream, but rarely from recreation) they are hard to measure and likely to be outweighed by productivity enhancing benefits accruing directly on the farm. Hence the policy focus in our projects has not tended to concentrate on instruments designed to reduce environmental damages downstream, of which there are several that can be used in lieu of subsidies. These include:

- Moral suasion: Environmental education is unlikely to work for downstream impact avoidance on the part of poor farmers at the margin of subsistence who are hardly in a position to shoulder the significant costs of activities benefitting someone else.

- Direct Regulation: Conservation practices (e.g. barrier strips along stream banks) can be required of farmers. Doing so is unlikely to be optimal or dynamically efficient (promoting new technology) and may be hard to enforce in remote rural areas.

- Tradeable Pollution Permits: A system that assigns property rights to upstream polluters and producers of sediments and permits damaged parties downstream to purchase and retire those rights may work in certain cases, but monitoring and enforcement of non-point source pollution to maintain the asset value of the permits may be extremely difficult.

- Taxes: Taxes that, at least in principal, can be optimal but in practice would be hard to implement because of difficulties in monitoring actual discharges and other harmful effects can be placed on non-point sediment and pollution loads from farms[17].

While all of the above measures have their problems, subsidies to correct negative off-farm externalities are particularly problematic. First, they would have to be maintained in perpetuity to ensure a lasting reduction in non-point pollution, which could place a severe financial burden on the public treasury. Second, a uniform subsidy payment calculated at the point where the marginal benefit of damage reduction equals the marginal cost to achieve it generates producer rents (payments to infra-marginal producers in excess of their individual marginal control costs) that may attract additional farmers into the area, lead to an increase in hectares planted, and even lead to increased downstream damage. Finally, subsidized employment in watershed management activities can distort labor markets by raising the opportunity cost of urban employment. For all of these reasons subsidies are not advisable as a mechanism for controlling off-site (downstream) damages in upland watersheds; for this purpose other instruments should be considered first.

C. On-Farm Benefits

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environmental quality and projects will focus on those practices which are environmentally improving.

[17] Indirect, second best taxes on pollution generating farm inputs like fertilizer and other agrochemicals are not optimal, but they are easier to administer. Any tax scheme that places a burden on the rural poor is likely to be politically unpalatable.

The rationale for subsidies in the IDB's watershed management projects is not the control of downstream damage. Rather, it is as an incentive mechanism to facilitate the transfer and adoption of new sustainable farming techniques that increase farm profits and/or reduce farm risk, and, in many cases, promise some downstream environmental benefits as well.

To get the most out of public monies allocated for this purpose, least-cost subsidy programs should be **targeted**. That is, producers should only be offered enough money to cover their marginal cost of adoption, and producers with the lowest adoption costs and the highest benefits should be given priority over producers where the two are nearly equal. The problem in practice is how to design such a program. Complex farm models may be needed to estimate targeted payments across farms whose soil types and conditions and microclimates all vary and affect the result. Alternatively, some sort of auction mechanism, described in greater detail in Professor Hueth's paper, may help achieve a subsidy payment scheme that is lower in total cost than a system of equal payments to all participating producers.

Finally, it almost goes without saying that the subsidies should be **temporary** -- they should be paid on a one-time basis. Their purpose in the technology-adoption context is to bridge the period of net negative farm cash flows and stimulate adoption; not to create a permanent farm income support program.

III. Conclusions and Recommendations

Professor Hueth's review of published and unpublished literature and interviews with researchers in a number of Latin American countries and the United States led him to the following set of conclusions regarding the use of subsidies in watershed development projects.

- Existing research has not established a sufficiently strong relationship between land use practices in upland watersheds and downstream sedimentation damages at this time to justify subsidy programs in most watersheds. Moreover, the literature suggests there are alternative methods to high financial incentives of reducing sedimentation damages which are more cost effective.

- There is increasing recognition of the importance of ecological impacts as negative externalities relating to poor land use practices. These ecological impacts may be onsite in terms of reduced biodiversity, impacts on the hydrological cycle and impacts on local fisheries populations. Also, there may be downstream impacts in terms of reduced recharge to aquifers and human health impacts. These ecological considerations will increasingly be used as a justification for public intervention.

- If production practices exist which result in environmental benefits, but which are not profitable for producers, there is a justification for corrective action, but not necessarily in the form of subsidies as currently practiced. Subsidies in this context would have to be continued in perpetuity and thus would place a significant financial burden on the government. In addition, rent-seeking behavior by growers and prospective growers would likely cause significant economic losses. Alternative mechanisms which are recommended as corrective action in this case include: direct intervention (i.e. mandated management practices), the establishment of markets in pollution permits on land degradation, and although politically difficult, the use of Pigouvian pollution taxes in areas where feasible.

- Subsidies should be restricted to one-time transitional use mechanisms to achieve adoption of profitable and environmentally improving management practices. Reasons why growers may not have adopted such

proven profitable practices include insufficient cash flows, small increases in profitability, inadequate development of rural credit markets, lack of familiarity and experiences with new production technologies, and inaccurate perceptions of the true production costs and risks associated with these technologies. But, watershed management projects should require careful economic evaluation of alternative technologies prior to their approval.

- Cost effective incentive programs should be designed and implemented. These programs should be targeted, should minimize rent-seeking behavior and bring the largest number of hectares possible into the program for the budget available. Experience suggests subsidy programs should focus more on improved vegetative and agro-forestry management practices and less on structural projects. The design of least cost subsidy mechanisms should be considered for use on an experimental basis.

- The true cost and returns information regarding technologies which are transferred from experimental projects to the field will not be known until implemented. Hence, occasionally, it is anticipated that new technologies will not be economically feasible once the subsidy is terminated. Every effort must be made to minimize these experiences by using linear programming and/or spreadsheet models to evaluate proposed technologies.

- Greater efforts should be made to search for opportunities to create local institutions that can enhance economic well being of local growers and improve environmental quality. Extension efforts in this area could have a high rate of return.

Although the relationship between changing management practices in upland watersheds and reducing damages in downstream areas in tropical areas has not been shown to be sufficiently strong at this time to provide justification for most watershed projects, future research may strengthen this relationship. Moreover, increased economic development may increase the demand for reduced sediment loads downstream and hence increased the benefits from changing management practices.

Colonization and production on fragile land in upland watersheds is likely to continue for some time in Latin America, and the prospects for the development of more profitable and sustainable technologies is good. However, upland watershed projects should be viewed in the broader context of the economic development of the country, and as such, should take care not to create permanent distortions through the use of subsidies which impede this development process. Undoubtedly, there will exist cases in the future where increasing employment opportunities in urban areas and subsequent out migration from the watershed will be the most efficient resource use.

Conceptual Considerations on Subsidies for Forest Plantations[18]

Mario Niklitschek, Inter-American Development Bank.

Summary: *This paper presents an analysis of economic incentives for efficient forest management, based on a study that was conducted during the preliminary sessions of the draft bill on forest management policies in Chile. Two important distortions derive from the discrepancy that exists between the public and private perspectives on forest usage. First, longer rotation periods are more relevant to overall social welfare than to the purely private, partially because the benefits accruing from biodiversity preservation and recreation tend to go up along with the lifespan of the forest. Second, under competitive conditions in the absence of government intervention, there is a tendency to allocate lands to non-forest activities, thus exposing native wooded areas to deforestation in ecologically fragile locations.*

In order to correct these distortions and stimulate forest activities, the Chilean government established a financial incentive mechanism that reimburses 75% of the plantation costs only once for each reforested site. This type of subsidy only partially corrects the abovementioned distortions. A subsidy on plantation costs does not correct the distortion in the rotation period, and if it becomes necessary to grant subsidies to future plantations in order to keep an area forested, strong incentives will be created to shorten the rotation period. Further, the subsidy may stimulate a greater allocation of lands for forestry plantations. Moreover, if the system is not adequately defined according to the variation of environmental conditions of the soil, it could be highly costly and only have limited environmental impact. Given an ideal scenario with perfect information and no budget restrictions, the adequate instrument necessary to correct distortions in the species distribution, the rotation period and the allocation of land between forestry and other activities, is an incentive that lengthens the age of the standing stock of both native and exotic species on all forested lands, not just on plantations. The importance of international grant financing to produce global benefits from forests is noted.

1. Introduction

The literature in forestry economics stresses the multiple objective nature of forest management. Forests yield commercial benefits such as wood production and social benefits related to erosion reduction, water regulation, recreation, carbon sequestration and biodiversity. Government intervention could essentially be justified given that social benefits deriving from the forest are not fully exploited by the private sector. In an influential article, Samuelson argues that public ownership of forest land in the United States is necessary for the proper consideration of social benefits in decisions relating to forest management and use.[19]

In the context of developing countries with weak public institutions and a generally unsuccessful history when it comes to the protection of forest reserves from illegal occupation and destructive exploitation, the role of public intervention has apparently not been successful. Moreover, the economic reality of developing countries might also explain the limited importance given to some of the aforementioned social benefits. Recreational benefits are most likely modest when a large segment of the population finds itself trying to satisfy its most basic needs: shelter and nutrition. Carbon sequestration benefits are global, but the benefits accruing nationally are relatively small for many developing countries. Furthermore, in many cases empirical evidence does not clearly reveal the effects produced by reforested areas on erosion reduction and watershed management.

Two issues concerning forest management result from these specific conditions found in developing countries:

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[18] Translated from the Spanish language original. The author bears no responsibility for errors in translation.

[19] Paul A. Samuelson. 1978. 'Economics of Forestry in an Evolving Society', Economic Inquiry, Vol. 14 (December), pp. 466-92.

(i) The implementation of new mechanisms and an institutional framework allowing for global financial resource transfers, helping global beneficiaries contribute to forested area conservation and expansion; and, (ii) the consideration of indirect mechanisms based on regulations and economic incentives rather than depending on expropriation or the preservation of large tracts of forested land in the hands of the state. Comments on economic incentives for efficient forest management are subsequently presented, based on a study conducted during the preliminary sessions of the draft bill on Forest Management policies of the state of Chile (TASC, 1991, and Niklitschek & Bobenrieth, 1992)[20].

This analysis is based on the assumption that economically rational landowners operate within an open economy where there are costs associated with the protection of property rights. Issues related to the cost of capital and to the investment period are ignored since they are not unique to the forest sector, and would be better treated in the context of tax incentives and national policies affecting the level and composition of investment.

II. Competitive Solution Distortions

Two important distortions emerge from discrepancies between private and public (i.e. societal) valuation of the forest. First, a public viewpoint would favor longer rotation periods than a purely private one, whether it is achieved through postponing the harvest of a given species or through substitution of species that can withstand longer rotations (for example native timber versus faster growing exotic timber oriented to cellulose production). Second, the competitive solution in the absence of government intervention assigns too much land to non-forest activities, and native forest is cleared in ecologically fragile areas.

Distortions in the rotation period are due to the fact that social benefits that are tied to forest maturity cannot be fully replaced by new plantations. Biodiversity and recreational benefits, for example, increase with the age of the forest. Although the rate of carbon sequestration is higher in younger, rapidly growing forests, when such forests are cut and used to produce short-lived wood products (like newsprint), there may be little net gain in the amount of carbon sequestered, even if new plantations are added. This distortion is even worse if we consider that there are several harmful effects associated with forest exploitation such as scenic quality deterioration, access road erosion, and water contamination provoked by harvest waste. The volume of wood and therefore the utilization of transportation infrastructure increases under short-term rotations involving products of low value, possibly leading to traffic congestion and reduced useful lifetimes of roads and vehicles. Such additional costs are only partially perceived by private entities.

Because private enterprise does not receive all of the forest's benefits, land use is distorted so too much land is allocated to agricultural and livestock activities. Parcels are abandoned on lands that no longer have economic alternatives because the soil has been depleted and/or poor exploitative conditions exist with low productivity. This distortion is most drastic in the case of native forests because they tend to produce the greatest social benefits. From society's viewpoint it is desirable that native forest not be cut as soon as the private sector would like, and that a larger portion of land be covered by forests on a permanent basis. When competition for land suitable for forest exists, this situation leads to the excessive transformation of native forests into plantations with exotic fast growing species. Environmental groups have raised this issue in opposition to the development of

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[20] Niklitschek Mario E. and Eugenio Bobenrieth. 1992. "Incentivos Economicos para una Explotacion Eficiente del Bosque". Cuadernos de Economia. No.28 (December), pp. 463-480. Trabajo de Asesoria Economica al Congreso Nacional (TASC) No. 14. Director Responsable Felipe Morande. Publicacion de ILADES/Georgetown University, en colaboracion con la Union Social de Empresarios y Ejecutivos Cristianos (USEC).

large forest plantation projects in southern Chile.

III. Economic Incentive Schemes

In order to stimulate forest activities, several governments have established different types of subsidies and tax exemptions. The program of incentives used in Chile has been the most generous in the region. It includes 75% reimbursement of plantation costs for each reforested site. Furthermore, management costs of these forests as well as completed work for stabilization are subsidized. Forest sites are exempt from land ownership tax payments and receive a 50% reduction on corporate profits taxes from income earned on the exploitation of both native and planted forests. It is required that, in order to be eligible for these tax breaks, a management plan must be prepared and approved by the Government Forest Service (Corporacion Nacional Forestal), including the requirement to replant an area equal to the area harvested.

A scheme of incentives based on subsidies for plantation costs only allows for a partial improvement of the distortions previously indicated, and may even bring about perverse incentives. Although plantation subsidies are good mechanisms to encourage the use of lands as forest plantations, if they are not adequately targeted and related to different environmental conditions of soils, they can turn out to be highly costly and have a limited ecological impact. When there is competition between sites suitable for plantation and native forests, the tendency is to exploit the existing native forest and turn it into high growth plantations. Subsidized plantation costs do not eliminate the rotation period distortion. This distortion is further amplified when it becomes necessary to subsidize future plantation costs in order to maintain the amount of land under forest cover, creating strong incentives to shorten rotation periods even below the competitive solution.

Tax exemptions on forested lands along with tax reductions on harvest revenues create an implicit subsidy that increases with the quality and age of the forest and points in the direction of correcting distortions in the length of the rotation period and the distribution of land use between agriculture, livestock, and forest plantations.[21] Tax exemptions, however, do not create incentives for forestry on marginal soils that lack other economically viable uses, which constitutes a great limitation to using this instrument, for example, in watershed management. Moreover, profit tax rebates make the exploitation of secluded standing forest sites that are difficult to access more attractive. Another important limitation to using tax breaks as a means of promoting efficient forest management is the low property taxes that exist in many countries of the region. In this sense, property tax reductions may not be successful in modifying private agents' behavior to the extent desired.

IV. Conclusions

In an ideal world without public budget constraints (or assuming that public expenditures can be funded with lump sum taxes), and with perfect information, an acceptable way to correct distortions in rotation periods, the allocation of land between forestry and other activities, as well as the distribution of forest species, is a forest conservation subsidy. This type of subsidy should vary depending on forest type and maturity (thus, discriminating between native and exotic species). It must apply to both new plantations and existing forests. Likewise, since forests located on eroded lands in critical watersheds have a greater social value, the subsidy should be greater in these cases.

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[21] The tax on "idle land" used by some countries doesn't sufficiently discriminate between lands with high production potential and marginal lands with limited economic uses, and encourages the conversion of marginal forested land into pasture for extensive cattle ranching.

Subsidies should be directed to those regions where the environmental benefits are significant, recognizing that information regarding the environmentally beneficial role of forests is limited and that most of the countries confront severe fiscal constraints.

Looking at the North American experience in soil conservation programs and forest incentives, bidding schemes for the management of specific areas should be explored that reflect clearly established environmental objectives. In developing countries a key obstacle to achieving the efficiency impact of bidding schemes is the absence of a dynamic land market due to the lack of well defined property rights in isolated regions and high transactions costs.

Traditionally, forest conservation strategies, specifically applied to native forests, have included restrictions to exploitation such as the prohibition of harvesting. However, coercive mechanisms, mainly when unstable over time, scare off potential investors, since they create an unsure future when it comes to exploitation opportunities. Forest degradation results when there is no economic interest in conservation investments so the forest undergoes informal, inefficient exploitation which lacks the appropriate technological know-how. Since native forests produce the most social benefits, public action promoting forest conservation should be a priority within the sector, including technical assistance to small property owners as well as economic incentives directed towards the conservation of areas of special environmental importance.

In view of the above, and considering budget limitations, a solution must be found that balances native forest management/regulation and incentives for sustainable use, perhaps including grant financing from international sources such as the Global Environment Facility.

Round-Table Discussions and Workshops

Round-Table Discussion

After the presentations, the participants engaged in a round table discussion that converged around several themes, without reaching complete agreement:

1. **The use of subsidies is not appropriate for financing industrial forest plantations.** In Latin America many countries lack the macroeconomic, institutional, and political conditions that facilitated the success of the subsidy program in Chile. Further, once the process of economic, social and political reform is complete, and an initial critical mass of plantations established, it is likely that the private sector in some countries may have the economic, institutional, and technical capacity to undertake plantation forestry without subsidization. During the debate this argument was backed up by some participants by reference to the World Bank's practice of not financing subsidized plantation forestry in Latin America, suggesting the IDB should consider the same policy.

2. **Subsidies to plantation forestry are justifiable if they contribute to environmental quality improvement or reduce local poverty.** While unfavorable macroeconomic and institutional conditions an a given country could affect the profitability of forest plantation investments, this argument should not be used to forestall the creation of plantations whose objective is to improve the environment and reduce poverty, for example through agroforestry with small farmers.

3. **Countries requesting financing to support industrial forest plantation investment projects that include a subsidy element should supply environmental, social, and economic justification.** It should be demonstrated that the environmental externality and social benefits justify subsidies in proposals to the IDB. Several discussants questioned the empirical magnitude of these external benefits, and whether they accrue locally, nationally, or globally.

4. **Forest plantation projects may not necessarily be the best alternative to solve economic and social problems in many countries.** It is important to explore a variety of strategies in to resolve economic and social problems in rural areas to determine whether the forest sector has a comparative advantage relative other activities; in many countries it may not have.

Working Groups

The following specific issues were discussed in three working groups:

1)Is the use of financial incentives justifiable for forest plantation financing, given the current political reforms that approve the removal of market distortions?

2)Should the IDB become involved in financing plantation programs that are already receiving financial incentives from their own governments?

The issues identified during the presentations and the round table discussion were consolidated by the groups. All three groups independently concluded that subsidy programs for industrial forest plantations are

questionable on economic policy grounds unless compelling arguments can be brought to bear demonstrating a significant divergence between private and public benefits. The groups indicated that the IDB should take a cautious stance, and require a detailed analysis of the environmental and social benefits of forest plantation programs embodying subsidies from public revenues.

Table 1 below highlights the main conclusions reached by the three working groups.

Table 1. Summary of the Results of the Working Groups.

{PRIVATE }DISCUSSION TOPIC	Work Groups		
	Group No.1	Group No.2	Group No.3
1) Is the use of financial incentives for industrial forest plantations justified, given the attempt of current economic policy reforms to remove market distortions? Under what conditions can subsidies be justified?	Industrial forest plantation subsidies should not be considered until the following aspects, which constrain the possibility of forest development, are resolved: • Land tenure instability • Inadequate organization of forest sector • Imperfections within the forest and agricultural products markets • Credit market imperfections • Inefficient technical assistance for forests in the private sector. However, it is necessary to consider the possibility that once these issues are resolved, future r Other factors that interfere with the establishment of industrial forest plantations are: • Establishment of large single species plantations can have detrimental ecological effects. • The need to use large parcels of land to make the process of reforestation economically profitable activity can provoke the migration of local inhabitants. The use of incentives to finance industrial forest plantations is justified if the following condition is met: • Social profits should exceed social costs while private profits remain lower than private costs. When this condition is met the financing of industrial forest plantations is not a profitable enterprise for private companies, but is desirable from society's standpoint.	Subsidies are not appropriate for financing forest plantations under the following circumstances: • Few social and public benefits • Inefficient forest product markets • Absence of an efficient free market • Land tenure insecurity • Absence of credit markets • Absence of efficient propagation of science and technology • Absence of research on ecological matters including the management of native forest species	Subsidies could be justified on the basis of social and environmental considerations. However, in certain countries, when import substitution, poverty reduction, employment equity and creation are examined, it was found that the solution to many of these problems could be attained through more efficient alternatives than that of industrial forest plantation incentives.
2) Should the IDB finance plantation programs that receive government subsidies?	The IDB should reconsider financially supporting industrial forest plantation projects with governmental subsidies if the conditions presented under Discussion Topic #1 are not met. It should be acknowledged that forest plantations offer benefits which could eventually justify the IDB's financial help, including: • Positive environmental externalities. Plantations can reduce the level of native forest exploitation while promoting the protection of biodiversity.	Some aspects of the forest sector that should be supported before the financing of plantations that receive government subsidies is even considered, include: • Efficient technology generation and diffusion strategy.	Before considering the financing of industrial forest plantations, the IDB should support the following conditions which are necessary for the development of the forest sector:

{PRIVATE }DISCUSSION TOPIC	Work Groups		
	Group No.1	Group No.2	Group No.3
	• Creation of jobs and poverty reduction. The multiplier effect of the creation of jobs and incomes can be significant in the processing of additional products and services necessary to industrial forest development. Additionally, the following benefits of forest plantation programs which have been used in the past to justify this type of investments do not necessarily justify the use of subsidies: • Generation of foreign exchange earnings or decrease in forest product imports.	• Appropriate technical administration and technical assistance. • An increase in investments geared towards improving the quality of human capital.	• Strategies that improve the quality of human capital within the sector. • Research methods that improve the generation of technology in forest matters. • Efficient information systems on forest issues.

Annex 1. List of Participants.

Asunción Aguilá, Inter-American Development Bank
Flavio Bazán, Inter-American Development Bank
William Beattie, World Bank
Bruce Cabarle, World Resources Institute
Santiago Carrizosa, University of Arizona
Luis Constantino, World Bank
Arthur Darling, Inter-American Development Bank
Marko Ehrlich, Inter-American Development Bank
Olli Haltia, Jaakko Poyry Consulting U.K.
Richard Huber, World Bank
Darrell Hueth, University of Maryland
Kari Keipi, Inter-American Development Bank
Héctor Malarín, Inter-American Development Bank
Gabriel Montes, Inter-American Development Bank
Mario Niklitschek, Inter-American Development Bank
Ricardo Quiroga, Inter-American Development Bank
Charles Smith III, Inter-American Development Bank
Douglas Southgate, Ohio State University
Raul Tuazon, Inter-American Development Bank
William Vaughan, Inter-American Development Bank
Luis Zavaleta, Inter-American Development Bank

Annex 2. Workshop Agenda: January 19, 1995

9:30 am	Welcome	Flavio Bazán
9:40 am	Schedule of Activities	Kari Keipi
9:45 am	Agriculture Sector Program and Renewable Natural Resources Management in Ecuador.	Gabriel Montes
10:00 am	Industrial Forest Plantations as a Priority Area: A Socioeconomic Framework.	Olli Haltia
10:15 am	Subsidized Tree Plantations in Ecuador: Some Issues.	Douglas Southgate
10:40 am	Financial Incentives for Industrial Plantations in Argentina: The World Bank Story.	Luis Constantino
11:00 am	Debate	
11:20 am	Forestry Sector Success in Chile.	William Beattie
11:40 am	Incentives for Watershed Management	William Vaughan
12:00 pm	Debate	
12:30 pm	Lunch break	
2:30 pm	Workshop Task Assignment	Kari Keipi
2:40 pm	Coffee Break	
2:50 pm	Group Work	
3:20 pm	Presentation of Workshop Results and Discussion	Group Coordinators
4:00 pm	Comments on the Presentations	Douglas Southgate
4:30 pm	Reflecting on the Results	Luis Constantino
4:40 pm	Further Comments	All Participants
5:00 pm	Conclusions	Kari Keipi

Annex 3. Participant Evaluation and Follow-Up Report on the Workshop

Overall Impressions

Based on written evaluations and comments heard during and after the workshop, the event was a big success. Of the 14 people who filled out the evaluations, l0 considered the workshop to be "excellent" and four rated it "good." All l4 considered the speakers to be "effective," and 13 out of l4 stated the workshop had a positive impact on their present work. In addition, many participants suggested ideas for similar workshops in the future. (See the summary of evaluations that follows.)

From the point of view of the IDB's training and staff development observer (from EMD/DEV), the following factors contributed to the success of the workshop:

-The skillful work of the Coordinator (Kari Keipi) in planning, consulting, delivering, and managing the day's activities;

-The relevancy of the topic to the work of the Bank;

-A good mixture of different types of "actors," i.e. university professors of environmental economics, consultants, an official from a non-governmental organization, as well as the economists/forestry specialists/financial analysts from the two international financial institutions.

-An interesting methodology.

In view of the success of the workshop, it is recommended that similar inter-departmental and inter-agency programs on subjects relevant to the Bank be considered for the future.

Summary of Written Evaluations Received from 14 Participants

A questionaire was distributed to the participants after the workshop. The results follow.

To help us evaluate this workshop, please answer the following questions:

Question 1.The purpose of the workshop was:

-To exchange ideas among the speakers and participants regarding the relevance of financial incentives to Bank operations;

-To develop recommendations for the use of financial incentives in Bank operations.

Were these objectives met?

Yes: 11 No: --

Comments

-*The objectives were partially met. We certainly were able to exchange ideas about the relevance of subsidies to the Bank, particularly subsidies for industrial plantations. We did not explore, in depth, other financial incentives, such as taxes, penalties, performance bonds, etc. I don't think we made much progress on recommendations of the use of financial incentives in Bank operations. Such recommendations presumably would detail under what conditions different types of subsidies, incentives, etc. would or would not be appropriate, in a much more pragmatic matter that addresses the opportunities and constraints of project teams and "country teams".*

-*I found that the workshop created the appropriate environment for a frank and open discussion of the issue. Very good in its technical level.*

-*The first objective was met clearly; the second far less. Focus on the Ecuador project would have been useful at the end.*

-*# 1 - Yes, but it is not an objective, i.e., output. #2 - No, very few recommendations were made.*

-*Good workshop for exchanging ideas. Some* ***general*** *recommendations are valid,* ***but*** *one must be cautious, as there are specific case by case situations.*

-*Yes and no: Yes - in the sense that ideas were exchanged in a very open and serious dialogue among natural resources managers and economists. No - in the sense that this workshop cannot come up with general recommendations with regard to financial incentives in Bank operations, because the angle of approach was very case specific and started out from the questions of whether or not the IDB should provide a loan to finance subsidies for forest plantations in Ecuador. This would only be one of the potential incentives, and the questions "What does the IDB envisage to achieve in the biodiversity and forestry sector" and "What instruments would it have at its disposition to achieve such objective?" were not asked nor answered.*

-*The objectives were met because a clear consensus was made regarding the use of these mechanisms. The justification for using subsidies in these circumstances was not made.*

-*I think that the workshop gave useful suggestions about the requirements that have to be met, to justify the use of financial incentives in Bank's operations.*

Question 2.The primary issue to be discussed was:

-Is the use of subsidy-type incentives justified for industrial plantations in Latin America, given the current policy reforms to remove market distortions? Under what circumstances may the incentives be justified?

Part A. Was this issue discussed to your satisfaction?

Yes: 11 No: 3

Comments

-I suppose my main dissatisfaction, in retrospect, is the notion of industrial plantations. The definition of industrial plantations seems to be rooted in what species are planted and how they are treated silviculturally, without coming to grips on who would be eligible and what lands would be eligible. This was a major sticking point. If, as in our Ecuador example, such subsidies would be available to large industrial owners who are already fairly sophisticated and engaged in the industrial wood products markets, then the answer would be no, at the expense of the smallholders and/or very poor. Also, subsidies for particular species and particular technologies that may not be the most cost-effective means for achieving the positive environmental externalities considerably narrows the room for discussion. Again, we arrived at the conclusion that subsidies for industrial plantations, as defined, are not justified, without addressing the circumstances under which they may be justified, e.g. limited eligibility based on income or size of landholdings, or locations, e.g. where local environmental protection externalities could be produced.

-In spite of the important contributions of the speakers, some of the presentations were not properly focused and did not contribute significantly to answer the question under analysis.

-The papers distributed in advance helped to provide the background information that was necessary for an informed and intelligent discussion. While the seminar was short, its focus in technical aspects made it possible to accomplish its objectives in the time spent.

-This subject was thoroughly discussed and analyzed in depth.

-Time for working groups was inadequate. The problem was compounded by late arrivals who missed the morning session and had to have everything explained.

-No, this was a very important strategic question, which was ill-addressed and which was granted too little time for adequate analysis.

-It was totally discussed to my satisfaction. The case of Chile was used and it was concluded that it was more of an exceptional case than a rule to be followed.

-The seminar discussed this topic in depth and very clearly.

Part B. How would you personally/professionally answer the question "Is the use of subsidy-type incentives justified for industrial plantations in Latin America, given the current policy reforms to remove market distortions?"

Yes: 2 No: 6 Don't Know: 1

Comments

-Yes, but only for a fixed period and after several important conditions have been met, including economic, trade and institutional reforms.

-At root, no pun intended, is the unclear notion of what an industrial plantation is, since it seems to cover all scales of ownership and economic activity. As I look at it, the appropriate question derives from Bank policy on subsidies, that they need to be direct, transparent and of limited duration. In this regard, a subsidy that is directed towards the poorest segments of society for conservation activities would move towards being justifiable. Rather than specifying what trees to plant and how to manage them, however, I could envision making a range of conservation activities eligible, with some sort of cost-share formula and total amount constraints. Industrial tree plantations would be just one of a number of activities that a farmer could engage in. Thus the farmer could adjust his or her inputs of time and resources, given the land available to work with. Yearly payments for conservation easements might even be conceivable. This gets complicated to design and certainly administer, but it is more promising.

-Although there exists justification for introducing incentive to promote the conservation and expansion of the total forested area, particularly when funded with international resources, subsidies to the cost of planting industrial forest is an inefficient means to achieve this objective. The economic and social impactd of plantations in rural areas are also likely to be limited or negative when compared with other interventions oriented to promote rural development.

-In well-defined circumstances, the incentives may be justified, especially when environmental externalities warrant it.

-More than a yes/no/question, the justification may be based on the objective sought out. Although for the most part the use of subsidies would not be justified, under specific circumstances and objectives there may be cases where these incentives are justified. However, when to apply them should be decided under careful scrutiny of the particular project.

-To work, subsidy-type incentives for the forestry sector require a set of unique macro-economic and political conditions (Chile) hard to replicate elsewhere.

-Under specific and very limited circumstances.

-Again, there are specific case-by-case situations that merit special treatment. This question is not appropriate for the survey. Too broad; we can write a textbook on this.

-Yes, it is (for short-term) to get the plantations started. It is also justified on environmental grounds.

-No, it is not justified as it will create distortions in other markets and the allocation of scarce resources will affect other sectors with a more urgent priority.

-I think these types of incentives are not justified, because they introduce distortions in the operation of financial markets, and they don't produce measurable social benefits.

Question 3. The issue for the Bank was:

- Should the Bank get involved in the financing of industrial plantation programs?

Part A. Was this issue discussed to your satisfaction?

Yes: 12 No: 1

Comments

-Yes, although more time would have been useful to discuss more comprehensively this complex subject.

-The Bank should not get involved in this type of financing given that decisions to use subsidies obey a more strategic policy by the country than an economic and environmental one.

-I think the implications for the Bank were discussed in depth.

Part B.How would you personally/professionally answer the question "Should the Bank get involved in the financing of industrial plantation programs?"

Yes: 4 No: 5

Comments

-Yes, but with great caution.

-The Bank should not finance private sector investments under nearly subsidized conditions -- violates Bank policy on directed credit.

-It has occurred to me that yes, the Bank should be involved in financing industrial plantations, but direct subsidies for planting trees are a blunt, and probably inappropriate mechanism for doing so. As briefly mentioned in the workshop, there are opportunities for the Bank to finance creation and dissemination of information about plantations. As a Bank, there should be opportunities to make available long-term credit to those who establish plantations, or more radical attempts, such as options or insurance, for smoothing the long-term risk to individuals. Also lurking around this is the possibility of actually paying for measurable decreases in sediment, or increases in area covered by forest.

-The Bank may consider participating in such programs only when the countries present good cases of justification for themselves.

-Maybe, but only when circumstances merit it.

-Forestry practices used to achieve social objectives might justify incentives based on a case-by-case analysis.

-The question is too broad, under certain circumstances it should get involved.

-I personally don't agree, except when strong environmental benefits and public goods are tied to the operation.

-Even though the case of Ecuador does not seem to favor such an incentive, this does not mean that instrument should be strategically discarded.

-Although the Bank does not like to support private sector activities, it is important to develop sustainable forestry approaches. Industrial plantations can remove pressure on old growth forests and also can create jobs and possible export products which lead to increased foreign exchange reserves for the country.

-Yes, it should get involved as long as there are no subsidies and clear availability of internal funding.

Question 4. Did the workshop have a positive impact on your present work?

Yes: 13 No: 1

Comments

-It provided me with the knowledge of relevant experiences, of which I was not aware.

-I think the initiative was very important and it provided me with an opportunity to meet with highly qualified colleagues of both IDB and WB.

-It was good to have a forum to discuss the issues. I am not presently working on a project directly applicable to the workshop topics.

-Yes, it did, as we are currently working on a project where subsidies are used.

Question 5.Did the workshop allow you to establish professional contacts and networks to benefit you in your present or future work?

Yes: 13 No: 1

Comments: *None.*

Question 6. Did the workshop meet your expectations?

Yes: 13 No: 1

Comments

-One of the best, most open meetings I have attended at the Bank.

-Excellent

-No, because all presentations focussed on Chile with much repetition.

Question 7. Were the speakers effective?

Yes: 14 No: --

Comments

-Yes, but maybe they were too persuasive against an instrument while a proper analysis from a general perspective could not yet be presented.

-Mostly very good -- especially Luis Constantino.

-Yes, very effective and the organization and interest shown was exceptional.

Question 8. What is your overall rating for this workshop? (Please check one.)

Excellent: 10 Good: 4 Average -- Poor --

Comments

-Beyond expectations.

-As a workshop, the meeting was excellent, but at the same time the meeting bears a major risk to serve as a general policy platform if a better follow-up or continuation is not organized. That would be very harmful to the forestry and biodiversity protection sector! The workshop must have a follow up.

Question 9. If a similar workshop is organized in the future, what topics would you suggest for the program?

-Natural (especially tropical) forest harvesting/management techniques/economics.

-Subsidies for industrial pollution control.

-I would like to see us go beyond the tired notion of subsidies for industrial plantations and look at financial incentives for conservation on private land, which is really what we are talking about. Alternative mechanisms, more depth of discussion on appropriate conditions, rather than the theoretical neoclassical conditions (I know these at times retreat into their theoretical certainty in the face of difficult real-world situations), and more than anything start looking at designing, implementing and performance monitoring of such incentives.

-Evaluation of interventions that increase agricultural productivity, particularly irrigation, as mechanisms to alleviate rural poverty. Should governments subsidize these investments?

-I am biased, but: analysis of the impact of sectoral policies and privatization on the forest resources.

-Watershed management: incentives to use soil conservation practices.

-Social forestry, agroforestry and sustainable development; tourism, ecotourism and sustainable development.

-Cost recovery (justifying when and how); Market failures (best ways to deal with them).

-Solid waste management; water resources policy; watershed management; coastal management and fisheries.

-What would be the International Financial Institutions' (IDB) policy towards forestry and biodiversity conservation in light of current deforestation and atmospheric CO2 increase, and what are the problems that need to be addressed. What instruments can be applied and should the same rules established for other sectors apply to the forestry and biodiversity sector, given the world-wide deforestation and atmospheric CO2 increase?

-Watershed management/sustainable agriculture; solid waste management; public sector restructuring.

-Policies for sustainable forestry of natural forests.

Question 10. Other comments or suggestions?

-Keep up the good work.

-Excellent format and better than expected results (interaction).

-Good workshop; keep it up.