



**REGIONAL WORKSHOP**

---

**NEEDS AND PRIORITIES FOR FORESTRY  
AND AGROFORESTRY POLICY RESEARCH  
IN LATIN AMERICA**

**July 19-23, 1993  
San Jose, Costa Rica**

**Edited by: Marielos Alfaro  
Ronnie de Camino  
María Ileana Mora  
Peter Oram**

© Inter-American Institute for Cooperation on Agriculture (IICA).  
October, 1994.

All rights reserved. Reproduction of this book, in whole or in part, is prohibited without the express authorization of the Inter-American Institute for Cooperation on Agriculture (IICA). The views expressed in signed articles are those of the authors and do not necessarily reflect those of the Inter-American Institute for Cooperation on Agriculture.

The Directorate for Information, Communications, Training and Institutional Affairs (DICCAI), through its Print Shop, was responsible for the layout, and printing of this publication and Program II: Technology Generation and Transfer for the stylistic editing.

Regional Workshop Needs and Priorities for Forestry and Agroforestry Policy Research in Latin America (1993 : San José, C.R.) Report of the workshop / ed. by Marielos Alfaro...[et...al]. — San José, C.R. : Inter-American Institute for Cooperation on Agriculture. Technology, Generation and Transfer Program, 1994.

298 p. ; 23 cm.

ISBN 92-9039-252 5

Publicado tambien en español : Taller Regional sobre Necesidades y Prioridades de Investigación en Políticas Forestales y Agroforestales para Latinoamérica (1993 : San José, C.R.)

1. Política forestal - América Latina. I. IICA. II. Alfaro, Marielos. III. Título.

AGRIS  
K10

DEWEY  
634.9

October, 1994  
San Jose, Costa Rica

IICA  
# 2. 719  
1993  
INGLES

## TABLE OF CONTENT

INTRODUCTION .....	7
RESULTS OF THE WORKSHOP .....	11
CHAPTER I: Priorities for Forestry and Agroforestry Policy Research for Latin America .....	13
CHAPTER II: Constraints on Effective Forestry and Agroforestry Policy Research .....	21
CAPITULO III: Role and Priorities of International Agricultural Research Centers .....	23
INTRODUCTION TO THE WORKSHOP .....	29
Technologies and Policies to Halt Deforestation in Tropical Rain Forests <i>E. Adilson Serrao</i> .....	31
Forestry Policy and Development: The Chilean Experience <i>Hernan Cortes S.</i> <i>Ignacio Cerda V.</i> .....	71
The Role of Forestry and Agroforestry in Sustainable Hillside Development <i>Carlos J. Rivas</i> .....	91
Intersectoral and Interregional Policies and their Impact on Forestry Policy <i>Marielos Alfaro</i> .....	101
The United Nations Conference on Environment and Development and International Forestry Policies <i>Alicia Barcena</i> .....	123
Interventions for the Success of Social Forestry and Agroforestry in Latin America. Guidelines for Institutional and Policy Research <i>Ronnie de Camino Velozo</i> .....	133

<b>COUNTRY DOCUMENTS</b> .....	<b>161</b>
<b>Forestry and Agroforestry Policy Research in Costa Rica</b> <i>Guillermo Arias</i> .....	<b>163</b>
<b>Status of Research on Community-Based Forestry and Agroforestry Policies in Central America</b> <i>Carlos Brenes Castillo</i> .....	<b>167</b>
<b>Factors in Policy Formulation For the Forestry Sector: the Case of Chile</b> <i>Ignacio Cerda V.</i> .....	<b>169</b>
<b>Present Status of Research on Policies with an Impact on Forestry and Agroforestry Systems in Central America</b> <i>Dean Current</i> .....	<b>187</b>
<b>Present State of Forestry Policy Research in Mexico</b> <i>Hugo Alfredo Galletti</i> .....	<b>197</b>
<b>Agroforestry and Forest Research Policies in Jamaica</b> <i>Roy S. Jones</i> .....	<b>203</b>
<b>Honduran Institutions</b> <i>Paul J. Martins</i> .....	<b>209</b>
<b>State of the Art in Forestry and Agroforestry Policy in Uruguay</b> <i>Carlos Sere</i> .....	<b>213</b>
<b>Forestry Research in the Dominican Republic</b> <i>Manuel Serrano</i> .....	<b>217</b>
<b>Management and Conservation of Dense Tropical Forests in the American Tropics</b> <i>Jean-Marc Dubois</i> .....	<b>221</b>

<b>The Situation of Research on Forestry and Agroforestry Policies in Guatemala</b> <i>Carlos E. Figueroa R.</i> . . . . .	227
<b>REPORTS OF THE RAPORTEURS</b> . . . . .	231
<b>Policies and Technologies for Reducing the Rate of Deforestation in Tropical Rain Forests</b> . . . . .	233
<b>The Dynamics of Commercial Forest Development in Latin America</b> . . . . .	235
<b>The United Nations Conference on Environment and Development and International Policies on Forest Resources</b> . . . . .	237
<b>Ensuring the Success of Agroforestry and Social Forestry Programs in Latin America: Guidelines for Research on Policies and Institutions</b> . . . . .	239
<b>Forestry and Agroforestry Policies for Sustainable Hillside Development</b> . . . . .	243
<b>ANNEXES</b> . . . . .	247
<b>Words of Introduction to the Latin American Workshop on Research Priorities for Forestry and Agroforestry Policies</b> . . . . .	249
<b>Introductory Remarks</b> <b>Paveri-Anziani</b> . . . . .	259
<b>The International Food Policy Research Institute (IFPRI) Washington, D.C., E.U.A.</b> <i>Peter A. Oram</i> . . . . .	265
<b>Presentation: Raúl Moreno</b> . . . . .	271
<b>Closing Address</b> <i>Ronnie de Camino</i> . . . . .	275
<b>List of Participants</b> . . . . .	279

## **INTRODUCTION**

There is broad agreement that research on forestry and natural resource policies can give rise to policy reforms that can have an immediate impact on and change negative trends in the use and management of the world's forests.

In July 1991, the International Workshop on Forestry Policy Research Needs and Priorities was held to identify research priorities on forestry and agroforestry policies, as the basis for an international research agenda. The sponsors of the event were the International Union of Forestry Research Institutions, through its Special Program for Developing Countries (IUFRO/SPDC), the United States Agency for International Development (USAID), in collaboration with the United Nations Food and Agriculture Organization (FAO), the Forestry Program for Sustainable Development at the University of Minnesota, and the International Food Policy Research Institute (IFPRI).

In addition to proposing a preliminary international research agenda, it was decided that a series of regional meetings would be held to identify research priorities on forestry and agroforestry policies in Africa, Asia and Latin America, and to develop forms of cooperation within national, regional and international systems.

International centers conducting research in this field, specifically CIFOR (new in the field of forestry research), ICRAF and IFPRI, took the initiative in organizing the regional meetings.

The CIFOR/IFPRI/IICA Latin American Regional Workshop on Forestry and Agroforestry Policy Research Needs and Priorities was held in San Jose, Costa Rica from July 19-23, 1993, sponsored by CIFOR, IDRC, CATIE/RENARM, IFPRI and IICA, primarily through the IICA/GTZ project. IICA also served as the site of the meeting.

The specific objectives of the event were:

- ▶ To identify and propose topics for research on a limited number of priority problems related to policies affecting the most important aspects of forestry and agroforestry activities in the region.
- ▶ To discuss the most effective ways to conduct the research on the problems identified, with a view to making a positive contribution to solving the problems and eliminating barriers to the

conservation and sustainable management of forestry and tree resources in Latin America.

- ▶ To identify leading national, regional and extra-regional researchers and research institutions capable of addressing the priority topics identified.
- ▶ To develop ties for establishing and operating networks where the problems are shared by a number of countries or subregions.
- ▶ To determine the need to follow up on this workshop, including both research and training, in order to ensure implementation of the proposed agenda.

Forty-two participants from 18 countries attended the workshop in Costa Rica. They represented different areas of specialization and interest groups, including researchers, government officials, representatives of the private sector, communities, nongovernmental organizations, bilateral and multilateral agencies, and others.

The report is divided into five parts. The first summarizes the results of the workshop and consists of three chapters. Chapter I describes the priority research topics identified during the workshop and are classified as: i) macroeconomic and sectoral policies; ii) international policies; iii) systems for making and executing policy decisions; iv) policies on population dynamics; v) policies for placing a value on forests and the forestry sector; vi) policies on land tenure and forestry resources; vii) policies on technological development; viii) policies on communal forestry; ix) institutional policies, and x) human resource policies.

Chapter II describes barriers to research on forestry and agroforestry policies, and ways to overcome them.

Chapter III addresses the role and priorities of international research centers, specifically: the orientation of research, upgrading the institutional capabilities of national centers, beneficiary participation, and information management for policy research.

---

The second part contains the six papers that served as the basis for workshop discussions. The third consists of eleven documents presented by the participants. The fourth part contains the reports of the five working groups and the last is an appendix, with the list of participants and the terms of reference followed by the working groups.

Marielos Alfaro  
Ronnie de Camino  
Maria Ileana Mora  
Peter Oram



## **RESULTS OF THE WORKSHOP**

## CHAPTER I

### PRIORITIES FOR FORESTRY AND AGROFORESTRY POLICY RESEARCH FOR LATIN AMERICA

The policy research topics proposed by workshop participants were grouped into ten categories, described below. Priorities were determined for each category:

#### MACROECONOMIC AND SECTORIAL POLICIES

##### Macroeconomic Policies

Many macroeconomic factors play a role in deforestation and in the process of population shift toward the forest margins. What is the role of policies defining levels of poverty, concentration of income, access to land, distribution of food, demographic growth and unemployment?

Who are the "winners" and "losers" under current macroeconomic policies? The answer to this question will reveal the interests that drive these policies. At the same time, it is helpful to design strategies the forestry sector can use for "selling" its proposed changes to politicians.

##### Inter-Sectoral Policies

The purpose of this research would be to examine relationships among sectors, identify desirable changes in forestry policy, and design mechanisms for bringing about these changes. It would be important to study the impact that structural adjustment programs have on the different sectors, and specifically, on the forestry sector.

Studies of forestry and agroforestry policy should begin with a broad conception of the factors that determine how the land will be used, whether for agriculture, urban development or industry. These determinants include environmental factors, price policies, the regional structure of income and its relationship to the land use system, the legal setting, access to sources of funding, and survival strategies of producers.

The analysis of inter-sectoral policies should include at least agriculture, trade, energy, human settlements, and transportation.

Credit and external investment policies in the forestry sector also need to be examined.

### **Land-Use Policies**

Research is needed on induced and directed settlement, as well as squatter settlement. Studies should be based on the understanding that governments in Latin America do not have enough power to protect large stretches of land set aside in untouchable reserves; the countries need to encourage the development of social sectors able to manage natural resources sustainably.

### **Economic Relations among Upland Farming Zones, Upland Non-Farming Zones, Valleys and Urban Zones**

The contributions that these hillside areas make to national food production and the national economy need to be documented, along with the share of total land being occupied by forestry and agroforestry. The top priority here is to review past experience in the uplands in order to identify appropriate technology policies and development strategies that are effective for these conditions.

## **INTERNATIONAL POLICY RESEARCH**

### **Policies for International Trade in Timber and Non-timber Forest Production**

Another step is to evaluate the impact of international trade policies and agreements (ITTA, GATT, NAFTA, ISO 9000 Quality Standards, CITES) on the movement of timber and non-timber forest products (markets, prices, quotas), bearing in mind that the forestry sector has usually survived on the basis of subsidies. The possibility of financial or other mechanisms to compensate the countries for their losses needs to be examined, along with measures for conflict resolution. Research should also focus on the economic, social and environmental impact of trade liberalization policies.

Market restrictions also require scrutiny, including non-tariff barriers, boycotts on certain items allegedly produced in non-sustainable ways, and the use of "green seals." These studies should examine the impact on natural resources and on equity. Regional cooperation should be studied as a strategy for meeting the challenges of marketing forest products.

---

## **Trade Policies of other Sectors, with an Impact on Forestry**

Many international and domestic policies for other sectors, such as agriculture, livestock, housing and urban development, energy and transportation, strongly influence the forestry sector. Research on agricultural trade policies, for example, might shed light on the phenomenon of deforestation.

## **Policies of International Organizations**

Forestry sector development in Latin America is much affected by credit and other conditions set by international organizations. The successes and failures of programs and projects carried out with international cooperation need to be examined. Performance by the forestry sector can be improved if changes are introduced in procedures and methods, making them more responsive to local needs.

Along the same lines, it is necessary to identify different types of cooperation and evaluate their effectiveness.

## **Deforestation and Its Impact on the World Environment**

Research is needed to quantify the impact of deforestation in terms of erosion, biodiversity loss and CO<sub>2</sub> holding capacity. This is of top priority for demonstrating the magnitudes of existing resource loss. Such losses need to be incorporated into national accounting systems, which presently do not reflect the true cost of non-sustainable technologies and land-use systems.

Comparative studies can be conducted among different countries of Latin America, and between these countries and those of other regions, examining deforestation, forestry policies, technological change in the forestry sector, and community management of natural resources.

Models need to be developed to assess the environmental services we derive from forests. These studies should also examine the forest's contribution to food security and to conserving wildlife.

## **RESEARCH INTO SYSTEMS FOR MAKING AND IMPLEMENTING POLICY DECISIONS**

### **Participants and their Roles**

How do different social groups, related to forestry and agroforestry, make their political, institutional, economic and technological decisions? Research to answer this question must embrace sociology, anthropology, economics and political science. The approaches of political economics and political ecology are especially useful. A number of important variables need to be considered, including:

- ▶ The relative strength of interest groups.
- ▶ Degrees of centralization and concentration of power.
- ▶ Participation in decision-making by communities and producers.
- ▶ Management of natural resources by local communities, recognizing the differences among various ethnic groups.
- ▶ The presence of refugee groups and other displaced populations at the forest margin.
- ▶ The degree of community organization for managing natural resources, and factors that facilitate or hinder it.
- ▶ Violence at the fringes of the forest in some countries, and the importance of these areas for national security.

A balance must be found between global, regional and local research. Most research for decision-making has focused on the national level, where in fact, results are often difficult to put into practice. Little work has been done at the regional level, where no one has determined what factors are involved in political decision-making, or how the different participants fit in.

More action research is needed in order to learn about local-level decision making. Too little work has been done with the communities themselves.

---

## **Legislation and Institutions**

The issue of forestry legislation is attracting greater interest. The forestry sector is faced with many new demands, generated in part by the structural adjustment processes and the shrinking of government apparatus. Laws need to be simpler and clearly state the links between the forestry sector and other sectors of the economy.

How can institutions be strengthened to support local, regional and national development?

## **RESEARCH OF POLICIES ON POPULATION DYNAMICS**

### **Relationship between Population, Poverty and Natural Resources**

How does population movement affect forestry resources? Studies should identify and analyze the causes of migration toward forested areas, and specify mechanisms for preventing such shifts by creating conditions of employment in the places of origin. The relationship between population growth, reforestation, and farm tree establishment should also be examined.

## **RESEARCH OF POLICIES FOR APPRAISING THE VALUE OF THE FOREST AND THE FORESTRY SECTOR**

### **Measuring the Value of Deforestation**

Deforestation causes actual monetary loss to forestry resources and associated resources. This loss needs to be quantified in economic terms so politicians and the general public will understand the impact of non-sustainable land use on the economies of developing countries.

### **Policies to Increase the Added Value of Forest Products**

Research projects should analyze vertical integration by small- and medium-scale producers and evaluate the possibility of improving marketing methods in community forestry and agroforestry. Mechanisms for internalizing the positive and negative externalities of the forest need to be designed.

## **RESEARCH INTO POLICIES FOR LAND TENURE AND FORESTRY-RESOURCE OWNERSHIP**

What are the environmental, social and economic effects of the different land tenure and resource ownership systems? Patterns of land distribution affect the use of forest resources, and this also needs to be examined.

## **RESEARCH OF TECHNOLOGY DEVELOPMENT POLICIES**

What is the present state of technological knowledge for sustainable forestry and agroforestry? What options are available for a technology policy to deter deforestation? Many factors block the transfer and adoption of technologies compatible with sound management of forest resources, and these should also be explored.

## **RESEARCH OF COMMUNITY FORESTRY**

Important topics for research in this field include:

- ▶ The economic impact of community forestry and agroforestry policy on the campesino system, including the effects of alternative policies on various interest groups.
- ▶ How to encourage community participation, including that of women, in forestry and agroforestry programs; and the role of campesino and indigenous organizations in decision-making, for example on watershed management.
- ▶ Development of indicators of community-led social development for use in policy analysis. What are the returns to community forestry versus large-scale projects?

## **RESEARCH OF INSTITUTIONAL POLICIES**

Institutional policies need to be studied and reforms identified for making public institutions more efficient. It is also essential to define the role of NGOs in promoting forestry development.

What are the institutional arrangements for research, extension and technology transfer? What mechanisms are effective in encouraging community action for forestry and agroforestry?

---

## **RESEARCH OF HUMAN RESOURCE POLICIES**

**What are the weaknesses of available human resources? What is the most appropriate strategy? What mechanisms are needed for incorporating women into the development of the forestry sector?**

**The amount and quality of human resources needed for developing the commercial forestry sector need to be specified, as well as the best way to obtain these resources.**

**Curriculum review should be performed on training programs for technicians and professionals, in order to provide these people with the skills they need if they are to generate new options for small-scale producers.**



## CHAPTER II

### CONSTRAINTS ON EFFECTIVE FORESTRY AND AGROFORESTRY POLICY RESEARCH

Forestry and agroforestry policy research in Latin America is subject to many constraints, associated with the lack of human and financial resources and difficulty obtaining reliable information. Methodological and institutional problems are common.

Latin America has a strong foundation for policy research, but this does not include the forestry sector. The focus has been on industry or agriculture, not forestry. Ways must be found to direct the attention of the region's excellent policy researchers toward forestry and agroforestry issues.

Access to international information is in potentially valuable resources; however information flows are weak, and some information is deliberately withheld by commercial interests.

Policy research is also impeded by lack of basic time series data on forest resources, input use, production, markets and prices, and utilization. The impact of policy on such factors is therefore difficult to evaluate.

Yet, many existing institutions have problems sustaining policy research. Policy analysis offices are often supported by international funds. Since such studies need continuity, they must find ways to combine national resources with international financing. Thus, funding for policy research is a high-priority need. Even as international aid funds are drying up everywhere, much investment is going into the implementation of short-term policies through consultant contracts. This investment could be devoted to more profound, long-term research. Mechanisms for accessing funds in this area need to be more transparent.

Training is a vital factor in finding solutions. The emphasis in university education needs to change, especially at the undergraduate level. The orientation should be toward environment and human rights, using an interdisciplinary approach. The countries need more forestry economists able to demonstrate in practical terms the advantages of managing forestry resources wisely. Also needed are more political scientists and, in general, social scientists.

**CHAPTER III**  
**ROLE AND PRIORITIES**  
**OF INTERNATIONAL AGRICULTURAL RESEARCH CENTERS**

The International Agricultural Research Centers (IARCs) can play an important role in forestry and agroforestry policy research in the region.

**ORIENTATION OF RESEARCH**

Forestry and agroforestry policy research should supply information for giving fast, timely responses to decision-makers. This requires work in the following fields:

**Methodology Development**

- ▶ Develop methodologies appropriate for research at every scale (local, regional and national).
- ▶ Develop methodologies for different users (professional researchers, NGOs, communities, policy analysts).
- ▶ Conduct research at selected sites, representative of each different level and type of user, disseminating methodologies to other sites.
- ▶ Emphasize "strategic" research, specifying content, design and implementation for sites and topics studied.
- ▶ Explore affordable data collection methodologies for policy analysis.

**Regional Studies**

- ▶ Undertake comparative studies of experiences with forestry and agroforestry policies in various countries of the region.
- ▶ Prepare a compendium of studies already available in the countries.

**Analysis of the International Environment**

- ▶ Study international trade in forestry products.

- ▶ Study the effects of international policies on the forestry sector.

## **ENHANCING INSTITUTIONAL CAPABILITIES IN THE REGION**

Policy research by international organizations should be conducted in cooperation with national institutions, thus providing training for national professionals in these areas. International organizations could strengthen not only centralized national entities, but also regional and local organizations.

### **Policy Analysis Training for Professionals**

- ▶ Assist the region's existing research centers with studies on forestry and agroforestry policies.
- ▶ Connect centers engaged in policy studies with those investigating forestry resources.
- ▶ Improve the training of local personnel by disseminating simple systematic methods that can be used extensively, and by strengthening teams capable of using more sophisticated methods over the long term.

### **Promote Cooperative Networks and other Types of Support**

Cooperative networks play an important part in promoting the exchange of information and experiences among institutions and preventing duplication of efforts. The recommendations are:

- ▶ Strengthen cooperative networks that already exist in the region.
- ▶ Create new networks as necessary for meeting objectives.
- ▶ Strengthen research infrastructure and technological media (libraries, electronic communications, geographic information systems, simulation models).

### **Facilitate Policy Research**

- ▶ Develop and test methods of collecting data for policy analysis.

- ▶ **Attract financial resources to cover their own agendas, and their partners in collaborating countries.**

### **Selection of Partners**

- ▶ **Work directly with qualified individuals and strengthen institutional capabilities over the long term.**
- ▶ **Work extensively with national researchers. If international experts are involved, they should perform the smaller share of the work.**
- ▶ **Identify and work in coordination with research centers of recognized prestige and appropriate capabilities.**
- ▶ **Select collaborators from several different sectors, in order to break down sectoral isolation.**
- ▶ **Promote research in institutions that are relatively free of pressures from political interests, donors, etc.**
- ▶ **Promote the work of interdisciplinary groups.**
- ▶ **Work with all collaborators on a peer basis, including co-publication of research results.**
- ▶ **Promote communication through electronic media.**

### **Facilitate Dialogue on Policies**

- ▶ **Promote dialogue on forestry and agroforestry policies, addressing regional and global issues.**
- ▶ **Encourage neutrality and scientific objectivity in formulating hypotheses and in research methodologies, seeking broad dissemination and wide discussion of results.**

## **PARTICIPATION OF BENEFICIARIES**

The international organizations tend to follow fashions and work on internationally high-profile activities. As a result, many initiatives that are important at the national local levels are never pursued. This is

why it is so important for beneficiaries to participate in designing research. The work of all organizations should have a local base. The following strategic guidelines are proposed:

### **Orient Research to Respond to Needs of the Region**

- ▶ Orient research according to regional, national or local needs, encouraging donors to respect priorities established at each of these levels.
- ▶ Initiate research by sounding out local needs.
- ▶ Update the agenda on a regular basis.

### **Local Base for Research**

- ▶ Conduct local research with municipalities or local governments, NGOs, producer organizations, and the like.
- ▶ In local studies, make commitments to local research partners.

### **Participatory Research**

- ▶ Opt for research methods that encourage real participation by local users of forestry resources.
- ▶ Share research results with local people and other participants.
- ▶ Design studies that will directly benefit the local population and local partners.

### **Communication between Researchers and Users of the Results**

- ▶ Bring in policy decision-makers from the time research is first formulated.
- ▶ Broadly share preliminary results among potential users (government, NGOs, farmer organizations).

---

## **INFORMATION MANAGEMENT**

Information is a key element in making decisions. It needs to be managed efficiently so it will be available to users when they need it. The following steps are suggested:

### **Information Services**

- ▶ Collaborate with other responsible international bodies such as FAO, and with countries they are working in to improve statistics on the forestry sector.
- ▶ International exchange of information on forestry and agroforestry policies (including translation).
- ▶ Provide assistance in the establishment of effective data management systems, and training in their efficient operation and in dissemination of information.

### **Dissemination of Results**

- ▶ Organize and support seminars on forestry and agroforestry policies and on policies that target other sectors but have an effect on the forestry sector as well.
- ▶ Promote broad dissemination of research findings.
- ▶ Persuade donors to establish consistent research funding policies.
- ▶ Promote regional-level publication of policy research findings, targeting both professionals and the grass roots.

# TECHNOLOGIES AND POLICIES TO HALT DEFORESTATION IN TROPICAL RAIN FORESTS

E. Adilson Serrao<sup>1</sup>

## INTRODUCTION

Lowland vegetation in the humid tropics is composed mainly of wet forest and rain forest. It is estimated that these forests cover 1,460 million ha., or roughly 48% of the total surface area of the humid tropics (approximately 3,000 million ha.) (FAO 1991). Nearly 70% of the world's rain forests are to be found in Latin America, with the remainder situated in Africa and Asia.

The most common soils in the humid tropics (NRC 1992) are oxisols and ultisols. Oxisols, which are generally acidic, low in phosphorous, nitrogen and other nutrients, are for the most part found in South America. Ultisols - usually deep, red or yellowish, well drained soils with a higher proportion of minerals that are affected by climatic conditions than oxisols - are also acidic and low in nutrients. They are more common in Central America, the Amazon Basin and the humid coastal regions of Brazil. The youngest types of soils, mainly inceptisols and entisols, account for most of the remaining soils in the humid tropics. They range from very fertile alluvial or volcanic soils to very acid, infertile sands. Tropical rain forest vegetation grows by retaining and efficiently recycling the ecosystem's limited quantities of essential nutrients and micronutrients.

Tropical rain forests provide a whole range of products and environmental services. They make an important contribution to climatic interaction at the local and world levels, performing functions that include: maintaining biological diversity, providing basic products, helping to protect soils, stabilizing hydrological systems and maintaining the supply and quality of water, and mitigating the effects of storms.

For present purposes, the term "forest conversion" is taken to mean the alteration of forest cover and forest conditions as a result of human intervention, ranging from marginal modification to fundamental transformation (National Academy of Sciences 1980). Deforestation - changes in land use that reduce forest cover to less than 10% - is the

---

<sup>1</sup>

Researcher with the Center for Agroforestry Research in the Eastern Amazon Region - CPATU/EMBRAPA, Belém, Brazil.

most extreme form of forest conversion. But whether the conversion involves only marginal modification or complete deforestation, it alters the structure of forests, species diversity, the biomass, forest successions and the dynamics of the ecosystem.

Forest conversion takes place when the original forest is eliminated and replaced with permanent agriculture, plantations, pastureland, or urban or industrial development. It is estimated that some 600 million ha. of the 1,500 million ha. of tropical rain forest that originally existed in the world have already been logged and converted (Erlach and Wilson 1991). As a result, Africa has lost over half its original forest (almost 52%), followed by Asia (42%) and Latin America (37%) (Lean *et al.* 1990).

The pace of deforestation in the humid tropics has quickened over the past two decades. In the 1980s, Latin America had the highest annual rate of deforestation in the world (7.3 million ha.), followed by Africa (4.8 million ha.) and Asia (4.7 million ha.) (FAO 1991). The highest rate of deforestation within Latin America itself was in the Brazilian Amazon, where roughly 35 million ha. of forest were logged for development of different kinds (Brazilian Institute of Space Research 1990).

A number of direct and indirect causes, usually acting together, contributed to this situation. Foremost among them were: large-scale commercial logging, the expansion of the agricultural frontier and the subsequent use of the land by subsistence farmers, the conversion of forest to perennial tree plantations and other commercial crops, commercial pasture-based cattle ranching, land speculation, the use of timber for fuelwood and charcoal, and large-scale land settlement. (Repetto and Gillis 1988; Hecht and Cockburn 1989).

The forest conversion process is driven by a number of national and international forces (or indirect causes). Widespread poverty, inequitable income distribution, flawed food distribution policies, soaring population growth and density rates, high fiscal deficits, underemployment, contributory fiscal policies, the granting of forest use rights, rents, financial and credit incentives - all these factors contribute to forest conversion throughout the humid tropics.

At present it is difficult to accurately gauge the environmental, social and economic impact of forest conversion on agricultural and silvicultural development, as it depends on factors such as the



characteristics of the original forest, the nature of the conversion, the methods used, the social and economic setting in which the conversion takes place and subsequent land use and management.

## **DEFINITION AND EVALUATION OF SUSTAINABILITY**

A land use system is said to be sustainable when its productivity is increased or maintained by means of efficient resource management at levels that are economically viable, environmentally rational, socially equitable and culturally acceptable, while damage to the environment or human health is kept to a minimum (NRC 1993). Sustainability should be a fundamental criterion in the analysis and application of technologies and alternative land use systems designed to control deforestation. The creation of sustainable land use systems aimed at agricultural and silvicultural development in the humid tropics depends on their permanence in a given region and the attainment of higher land and manpower productivity levels to reduce the intensification of deforestation.

In implementing this concept of sustainability, a balance has to be achieved over time between agrotechnical, economic, ecological and sociocultural viability. Such a balance can be difficult to maintain in agricultural and forestry land use systems in the humid tropics. Indeed, it is no exaggeration to say that none of the region's current agricultural or forestry systems come close to meeting these conditions for sustainability. Analyses of the sustainability of agricultural and forestry land use systems should take account of the present and potential importance of their level of utilization (the total surface area and number of farmers involved), the type of users within each system, their economic importance, future markets, the environmental impact, and the prospects for agroindustrial development. Sustainability analysis should also include the technological systems employed (e.g. the intensive use of land and manpower, the use of inputs, the adoption of technology, the processing of products and management technologies) and productivity patterns (such as maintaining productivity, the potential for higher productivity and the relationship between productivity and the environment) (Serrao and Homma 1993).

Another important aspect of sustainability analysis is that, from the agrotechnical standpoint, sufficient land for agricultural and silvicultural development has now been deforested in Latin America to produce enough food and fibers to meet the needs of the population for the next twenty years. It is projected that the present population of

around 380 million will have reached roughly 500 million by the year 2010 (PRB 1991). By 1991 some 40 million ha. of Brazil's Amazon forest had already been converted for agricultural and silvicultural development. Provided that appropriate use is made of the available natural resources, this is more than sufficient land to meet the food and fibre needs of the present population of 17 million people, which is expected to rise to 25 million by the year 2010. England, Italy and France combined produce food for roughly 180 million people on 30 million ha. of cultivated land.

In order to promote sustainable development and combat deforestation, the current level of sustainability of agricultural and forestry land use systems must be evaluated. Serrao and Homma (1993), for example, undertook an evaluation of this kind to determine the main land use systems presently employed in Brazil's Amazon region. They used certain technological (or agrotechnical), economic, social, ecological and cultural parameters (see Appendix 1) to analyze the sustainable development of agriculture and forestry. Present land use systems include the extraction of non-timber products, logging, shifting or migratory cultivation, the production of perennial and semi-perennial crops, plantation forestry, agroforestry systems, and pasture-based cattle ranching on deforested lands. The evaluation revealed that the present level of sustainability of the systems in question (agroforestry systems apart) was, generally speaking, quite low, but could be enhanced by harnessing existing scientific knowledge and technologies and conducting further research to reduce the biophysical and socioeconomic constraints to a minimum. Similar exercises should be carried out in all regions of the humid tropics, using improved methodologies.

## **ALTERNATIVE LAND USE SYSTEMS**

A number of important points must be taken into account in creating and promoting alternative land use systems designed to increase sustainability and reduce deforestation in Latin America to a minimum.

The latest report of the US National Academy of Sciences's National Research Council on the subject of "Sustainable Agriculture and the Environment in the Humid Tropics" (NRC 1993) points up the need to establish sustainable land use systems that:

- a) Help maintain the long-term biological and ecological integrity of natural resources.
- b) Provide farmers and agro-related industries with economic benefits.
- c) Contribute to the quality of life of the rural population.
- d) Strengthen the economic development strategies of countries in the humid tropics.

These key considerations clearly apply to the Latin American humid tropics. Another important point is the fact that:

- a) There are converted or degraded forest lands that could be rehabilitated throughout the region.
- b) A wide variety of land use systems exist, ranging from those that cause minimum damage to natural resources to others that result in widespread deforestation.
- c) Some regions, such as the Brazilian Amazon, have begun to successfully replace economic growth based primarily on the harvesting of forest with a more diversified economy that includes employment outside the agricultural sector.

Another key element is the need to establish an integrated approach to land use, taking into account the region's cultural and biological diversity, incorporating ecological processes and including local communities in every phase of the development process. Past experience of agricultural development in the humid tropics, especially in South America where it has been based on the slash-and-burn technique, has clearly demonstrated that while monocropping (pasture, annual and perennial crops, timber tree crops, etc.) has - and will continue to - play a part in the overall mosaic of a given region, the situation is different at the farm level, where the biotic effects (such as pests, disease and weeds), climatic and socioeconomic impacts (such as transportation, market fluctuations and saturation, credit, etc.) are felt much more strongly, especially by small farmers. In their case, particular - though not necessarily exclusive - emphasis should be placed on applying an integrated approach to agricultural and forestry development.

Another important point to be borne in mind is that no single land use system could satisfactorily meet all the conditions for sustainability, nor be adapted to the different socioeconomic and environmental conditions that exist in the region. Every land use system has its own particular advantages and disadvantages as far as sustainability is concerned, and in most cases only an appropriate combination of systems can help stabilize forest buffer zones, rehabilitate logged-over land, restore degraded and abandoned land, raise the productivity of small farmers and provide employment in rural areas.

### **ALTERNATIVE LAND USE SYSTEMS FOR FORESTS, CROPS AND CATTLE**

The different land use systems employed in Latin America's humid tropics range from natural forest reserves to the intensive consumption of natural resources and forest, and crop and cattle systems that call for large amounts of modern inputs. Agricultural and silvicultural development in Latin America, especially South America, is presently undergoing a transition. There is a move away from the extensive, unsustainable exploitation and slashing-and-burning of forest resources to less extensive use, and the attendant intensification of land use will undoubtedly call for more rational options to be adopted, with greater technological, socioeconomic, environmental and cultural sustainability.

If farmers and agricultural development planners are to be afforded easy access to land use systems, the latter first need to be classified according to their agrotechnical (biophysical), economic, social and environmental characteristics and carefully documented (NRC 1993). The place and function of each system and the conditions required for its application and development must be established - keyed, of course, to the national and local biophysical and socioeconomic setting.

Figure 1 presents land use systems which, according to the different combinations at regional and farm-level, could be used to enhance the sustainability of agricultural and forest development and reduce deforestation in Latin America's humid tropics. Table 1 provides details of their biophysical, social and economic characteristics as regard to sustainability.

## **Primary Forest Management**

### ***Forest Reserves***

The lack of sustainable agricultural and forest land use systems that would guarantee the protection of primary forest and wildlife and allow them to perform their biological and physical functions for the benefit of the local, regional and world population has made it necessary to establish forest reserves in strategic parts of the region. For example, seven national parks, seven biological reserves, 11 ecological stations, 20 national forests, and two or three ecological reserves have been created in Brazil's humid tropic regions. A total of some 28 million hectares are involved. In other countries, mainly Bolivia, Ecuador and Peru, eight million hectares have been set aside for national parks and biological reserves. In the Colombian Amazon, 22.5 million of the 38 million hectares of land have been designated as parks or Indian reserves (Bunyard 1987). Generally speaking, the creation and conservation of forest reserves calls for strong political and financial support, especially as regards law enforcement, the involvement of the local community and the efficient management of the reserves in question.

This system of land use has many biophysical and environmental attributes as far as sustainability is concerned, but offers few immediate social and economic advantages (Table 1).

### ***Extraction of Non-Timber Forest Products***

Although extraction activities are the longest-standing form of land use in Latin America's humid tropics, it has only been over the past two decades that they have attracted the attention of ecologists, agronomists, anthropologists, biologists, social economists, politicians and governments, mainly due to environmental concerns. They are of considerable socioeconomic importance in the Brazilian Amazon where at least 70,000 families make a living by extracting products such as rubber, Brazil nuts, heart of palm, oils, fruits and medicinal plants. Between 1989 and 1990, 12 extractive reserves encompassing a total of three million hectares were created in the Brazilian Amazon. Around 20,000 families make a living from the extraction of non-timber products.

Generally speaking, the extraction of non-timber products is an activity low in terms of productivity and high in terms of ecological sustainability, but with a low level of social and economic sustainability (Serrao and Homma 1993). The extraction of forest products of this kind offers few opportunities for increasing socioeconomic sustainability or extending its application as a land use system. This is due primarily to demographic pressure on the remaining forest lands, the emergence of synthetic products and the domestication of plants from which products with current or potential economic value are obtained. However, the sustainability of extractive reserves could be enhanced by making them an integral part of broader land use systems, based primarily on more intensive agroforestry development models that help diversify the economic base of already existing extractive reserves. The productivity and, therefore, the sustainability of the extraction of non-timber forest products in extractive reserves could be increased by developing high-value crops and trees that would be easy to introduce and require few inputs to improve the reserve and be integrated into agroforestry systems.

### ***Extraction of Timber Products***

Logging in the natural forests of the humid tropics of Latin America, especially in the Amazon Basin, has become increasingly important and has intensified over the past two decades due to the rising prices of certain species of regional timber such as mahogany, sucupira, feijó (*Goldei cordia*), ipé and macaranduba (the milk tree).

Generally speaking, efforts to conserve the timber-yielding capacity of the forest or generate plantation production to replace the volume of timber extracted have been practically non-existent or have failed completely to satisfy the real needs of the region.

The present method of extracting timber products offers a moderate level of ecological and social sustainability and a low to moderate level of economic sustainability (Serrao and Homma 1993). As far as the use of capital is concerned, the technological intensity of the extraction of timber products has been high, but low in technical-scientific terms, with low productivity per area, moderate per capita productivity and very high productivity per unit of capital invested (Table 1).

Over the short and medium term, the potential for increasing agrotechnical, ecological and socioeconomic sustainability through the

extraction of timber products is moderate. However, due to the current and potential economic importance of tropical timber products at both the national and international levels, there is every likelihood that this land use system will be extended.

The know-how and technologies for extracting timber from native forests already exist. There are still biological and economic drawbacks, however. Nonetheless, timber extraction should be carried out, using sustainable natural forest management practices, in order to curb deforestation in Latin America, especially in Amazonia. Political decisions are required to support and implement sustainable timber product extraction.

As yet, no agroecological zoning work has been carried out, but this is necessary to establish forest reserves that guarantee the conservation of forest ecosystems and current and future supplies of timber. The economic constraints to achieving sustainability can be overcome by modifying market strategies to encourage those persons who effectively implement sustainable timber extraction models. Strategies of this kind should be accompanied by a modernization of the industry.

Research efforts should focus on basic and applied research into natural forest management techniques, the fertilization of logged forest and the use of timber products for industrial purposes.

### **Secondary Forest Management**

Due to the growing deforestation caused by the development of agriculture and cattle-ranching in the humid tropics, the total area of secondary forest has also increased. Secondary forest is also assuming greater economic importance (fruits, medicinal plants, building materials, browsing, valuable tree species, timber, market accessibility, recovery of site productivity and pest reduction) (Brown and Lugo 1990) and ecological significance (forest growth rate, accumulation of biomass, hydrological benefits, biodiversity) (NRC 1993). See Table 1 for an assessment of the biophysical and socioeconomic importance of secondary forests. Now more than ever before there is a need to evaluate the vegetation of secondary forests, which forms part of the complex mosaic of tropical regions, and the human activities that take place within them. Combinations of land uses are common, reflecting varying levels of human intervention and with secondary forests at different stages of recovery from previous uses (Figures 1 and 2).

The transition toward sustainable agricultural development in Latin America, particularly in the Amazon region, should focus on deforested land and the development of sustainable agricultural and land use systems to contain deforestation in the tropics. To achieve this, it is necessary to understand the biophysical processes of the secondary forest vegetation and the factors that impact the preparation of deforested land for the management of more intensive agricultural production or the permanent use of the land. This will make it possible to maintain the forest cover and develop secondary, and ultimately, primary forests.

Secondary forests are a source of nutrients for commercial agricultural production and as such should be used as a model for designing sustainable agroecosystems once their productivity has been restored and pests and disease reduced. In doing so, options should be sought that foster the transition from typical secondary vegetation to more agroforestry-oriented sustainable production systems.

Before secondary forests can be used for ecological or commercial purposes (regeneration of the forest with the fertilization of high-value trees) (Figure 2), much more needs to be known about the factors that influence short and long-term forest regeneration, ranging from technologies for speeding up forest regeneration keyed to specific barriers, to fertilization via the planting and cultivation of trees. Fortunately, information is now being made available on these two important aspects of secondary forest management aimed at containing



deforestation in South America's humid tropics (Nepstad *et al.* 1991, NRC 1993).

However, much work remains to be done in regard to the management and use of secondary forests, particularly on topics such as the interrelationship between flora and fauna, the role played by soil in regeneration, fire damage, the identification/ characterization of forest and non-forest products, fertilization, ethnobiology, social relations and the development of the appropriate technology.

### **Land Use Systems for Agricultural Production**

Outlined below are the land use systems that are currently used, and to one degree or another will continue to be used, for agricultural and forest production in Latin America's humid tropics. They are based on the use of the forest ecosystem as a source of energy via the logging and, in most cases, burning of the forest biomass. Brief descriptions are provided of the biophysical and socioeconomic characteristics of these systems that help increase sustainability and mitigate the effects of deforestation. The types of research needed are also highlighted.

#### ***Shifting Cultivation***

Shifting or migratory cultivation probably remains the most important land use system in the humid tropics of Latin America, especially in the Amazon region, not only in economic terms (roughly 80% of food crops such as beans, cassava, rice and corn, and most fruits are obtained from this type of land use) but also, fundamentally, in socioeconomic terms. In the Brazilian Amazon alone, at least 500,000 subsistence farmers eke out a living using shifting cultivation techniques (Serrao and Homma 1993).

Upland shifting cultivation systems are also important in ecological terms. Those same 500,000 Brazilian farmers, who on average farm two hectares of land for two consecutive years, currently need as much as ten million hectares of primary and secondary forest for slash-and-burn (Homma 1989).

While shifting cultivation will continue to be an important land use system in the Latin America's humid tropics, its importance will gradually diminish as the expansion of the agricultural frontier slows

due to restrictions on deforestation and the consequent need to intensify the utilization of land resources.

The sustainability of the type of shifting cultivation currently practiced is usually low or moderate in agrotechnical and socioeconomic terms (Table 1). Sustainability and stability could be increased, however. The first step toward achieving greater stability is to gradually increase the length of time for which the cultivated areas are used, introducing better systems and local crop varieties, observing the necessary fallow periods, maintaining permanent plant cover, diversifying cropping systems, and introducing plants and vegetable cover on natural fallow to restore its fertility. If the same piece of land was to be farmed, using the appropriate methods, for a further three or four years, the deforestation of primary and secondary forests by the region's small farmers could be reduced by at least 30%.

For shifting cultivation to be made more sustainable, there will need to be a transition process, with integrated land use systems gradually taking the place of traditional, slash-and-burn shifting cultivation. Agroforestry could play a very important part in this process given its resemblance to the systems used by farmers. The improved models that should be applied are those integrated agricultural systems that take advantage of the benefits of diversified production based on a combination of long-cycle and subsistence crops (Veiga and Hebbette 1992). The breeding of small, medium-sized and large domestic animals as an integral part of such systems (Figure 3) is extremely important, in the sense that it offers an element of financial security by minimizing the all-too-common risks of traditional shifting cultivation (biotic pressure, climatic diversity, market fluctuations, etc.).

For a variety of reasons, shifting cultivation is probably the agricultural activity that has benefitted least from research efforts in the Amazon region. Research support should be geared to gradually replacing traditional, slash-and-burn shifting cultivation with viable agroforestry and agropastoral systems that, to the extent practicable, allow small farmers to remain on their plots of land, thereby reducing "silent deforestation" (Homma 1989) and preventing those same farmers from being turned off their land in the future.

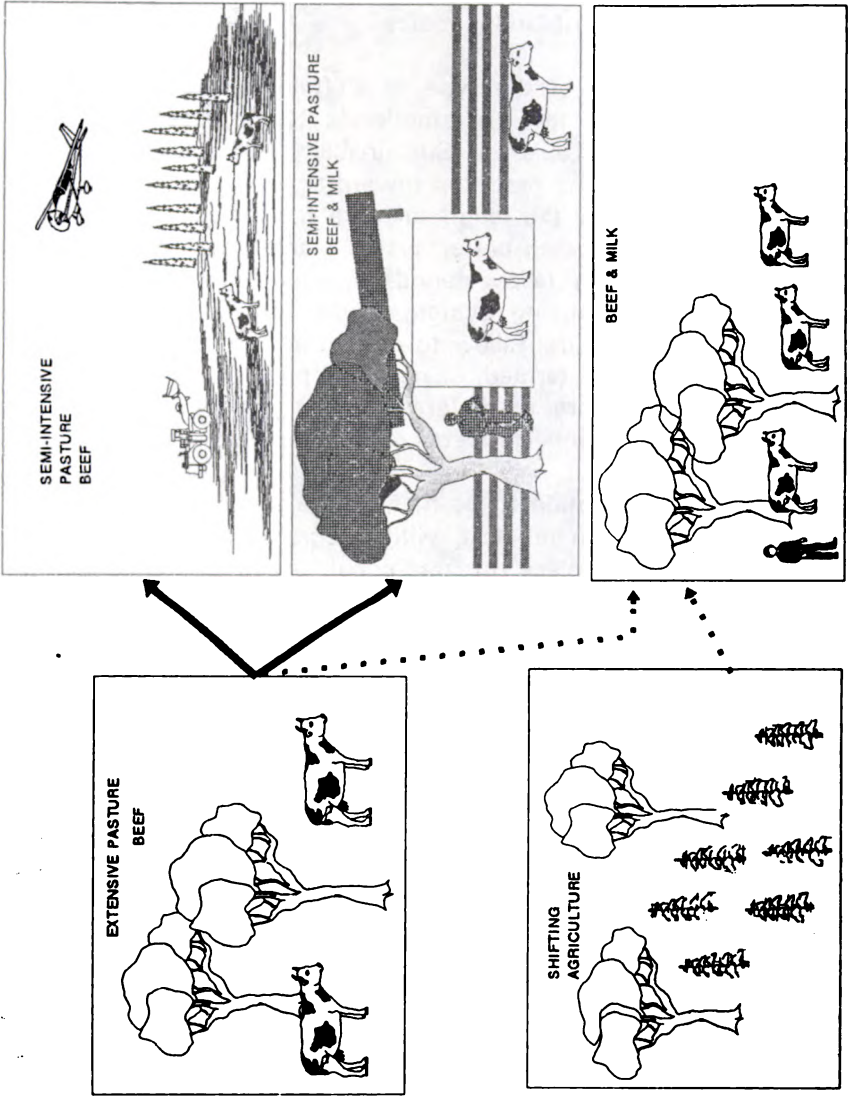


Fig. 3

## ***Cattle Ranching***

Cattle ranching undoubtedly makes a very important economic contribution to the agricultural development of Latin America and is carried out on small, medium-sized and large landholdings.

Large-scale stock raising, particularly in the Amazon Basin and especially in the Brazilian Amazon, is the land use system that has contributed most to deforestation in the region. Serious doubts have been raised about this land use system, in large measure due to its negative impact on the environment (Figure 1) (Serrao, at press) and its relatively meager socioeconomic benefits (Serrao and Toledo 1992).

Large-scale stock raising on first-cycle grazing land (pasture formed after primary forest has been slashed and burnt) has few biophysical and socioeconomic attributes (Table 1) and, therefore, low levels of sustainability in agricultural (degradation of pastureland), economic (declining returns due to low productivity), social (low employment, problems related to land ownership, most of the region's population are unable to afford the high price of meat) and ecological terms (at least 20 million hectares deforested in the Brazilian Amazon alone, widespread burning to create and manage pastureland, loss of biodiversity, edaphic losses, climatic changes) but relatively high levels of zootechinic sustainability (breeds of beef cattle well adapted to the regional environment).

The latest scientific discoveries regarding the factors that contribute to the degradation of pastureland and the positive experiences of some commercial operations in the region, particularly over the past decade, have also made it possible to improve sustainability to some extent, especially in agrotechnical terms (Serrao *et al.* 1979; Serrao, at press). The recovery of degraded pastureland by means of improved forage, the mechanized preparation of the soil, the planting of forage and the use of improved livestock management techniques are all playing an increasingly important role. This suggests that there are reasonable possibilities of enhancing the sustainability of cattle ranching in deforested parts of the region. Using the scientific and technical know-how already available (though further work is needed), livestock production in deforested areas could be made sustainable and meet the regional population's demand for livestock products (mainly meat and milk) at least until the year 2000. This would call for nearly half the total surface area deforested for this

purpose to be used correctly. In this context, the intensification of land use is extremely important (Serrao and Toledo 1992).

Over the medium and long-term, the virtually unsustainable extensive cattle ranching model that still predominates on deforested land in the region will shift toward models that call for more sustainable production systems, such as:

- 1) Semi-intensive, pasture-based, beef cattle-breeding models for medium and large-scale farmers.
- 2) Semi-intensive, pasture-based, beef and dairy cattle-breeding models for small and medium-scale farmers.
- 3) The integrated agrisilvopastoral model for medium-scale farms (Figure 3).

A shift away from the present unsustainable large-scale, monocultural, pasture-based cattle-ranching systems to integrated systems incorporating the production of grazing land, crops and trees would help to increase agrotechnical sustainability (fewer risks due to biotic pressures, better cycling and, therefore, better utilization of soil nutrients), economic sustainability (different sources of income), social sustainability (production of different products, more direct and indirect employment opportunities, greater efficiency in the use of manpower) and ecological sustainability (greater accumulation of biomass, a better hydrological balance and improved soil conservation, and better environmental conditions for flora and fauna at all levels) (Serrao and Toledo 1990; 1992).

Cattle ranching in deforested areas (Figure 3) should be based on land use systems that call for large amounts of technical and scientific expertise and small amounts of inputs compatible with the complexity of the region's agroecosystem and socioeconomic conditions. Greater attention should be paid to the breeding of cattle by small and medium-scale farmers. This in turn calls for basic research on the ecology of pasture weeds, the biotic and abiotic factors involved in the degradation and regeneration of pastureland, and nutrient recycling in pasture-based systems. Applied research should pay particular attention to the identification of food and forage crops, multi-purpose trees and animals in order to develop viable, integrated agrisilvopastoral systems.

## **Agroforestry Systems**

Agroforestry systems are land use systems in which tree and non-tree species are grown simultaneously or consecutively in combination with annual crops and/or pasture or perennial tree pasture for livestock production.

Agroforestry systems are regarded as the systems that make the most sustainable use of land resources in the humid tropics. Ideally, they should gradually replace or be incorporated into existing virtually unsustainable agricultural land use systems (large-scale pasture-based cattle-ranching systems, slash-and-burn shifting cultivation, and even the extraction of non-timber products, as has already been pointed out).

Great value is attached to the biophysical and socioeconomic qualities of agroforestry systems as far as sustainability is concerned (Table 1) (Serrao and Homma 1993).

Good possibilities exist for increasing the sustainability of these systems because:

- a) They can raise the productivity of agricultural land where the productive capacity has been reduced due to poor management that has resulted in soil compaction and the loss of fertility (e.g., under large-scale cattle-ranching and intensive shifting cultivation).
- b) They permit combinations of species with different energy needs, making more efficient use of this input because of the vertical stratification of the plants (and sometimes the animals) associated with them.
- c) As they are diversified, there is less risk of biological, natural-physical and market fluctuations.
- d) The introduction of the tree component into existing large-scale shifting cultivation and cattle-raising systems could considerably enhance their agrotechnical sustainability.

Agroforestry systems are not a cure-all. However, there is great potential for expanding their use as land use systems in the region, mainly among small and medium-scale farmers. In the future, when

further headway has been made with the sustainable development of regional agriculture, monocropping will even be possible, though the intensive use of capital may be required. However, these systems should play an increasingly important role in more widespread sustainable agricultural and forestry development in the region.

No single agroforestry model can be recommended for every situation. In fact, there are many possible models that combine annual, perennial, tree, shrub and herbaceous crops and large and small livestock (Figure 4). The most important thing is that the components be agrotechnically and ecologically compatible and that the products obtained be competitive enough to ensure the economic sustainability of the farmers who implement them (Fernandes and Serrao 1992).

In the eastern part of the Brazilian Amazon some farmers (especially those of Japanese descent) are applying commercial models typical of agroforestry systems with reasonable levels of agrotechnical and socioeconomic sustainability (Subler and Uhl 1990).

The large-scale planting of pepper is being replaced with different agroforestry systems that include perennial crops (such as cocoa, rubber trees, cupuaçu, cherimoya, papaya, avocado, Brazil nut and mango), palms (such as the assai palm, coconut palm, peach palm and African palm), shrubs and climbing plants (such as Barbados cherry, passion fruit, black pepper, guarana and annatto) and annual crops (cowpea, cotton, cassava and various fruits and vegetables).

In eastern Amazonia, these typical commercial systems are used, on average, on only 20 ha. of properties that range in size from 100-200 ha. Generally speaking, the rest of the land is left to permit the regeneration of the secondary forest once it has been used for shifting cultivation, or is covered by unlogged forest.

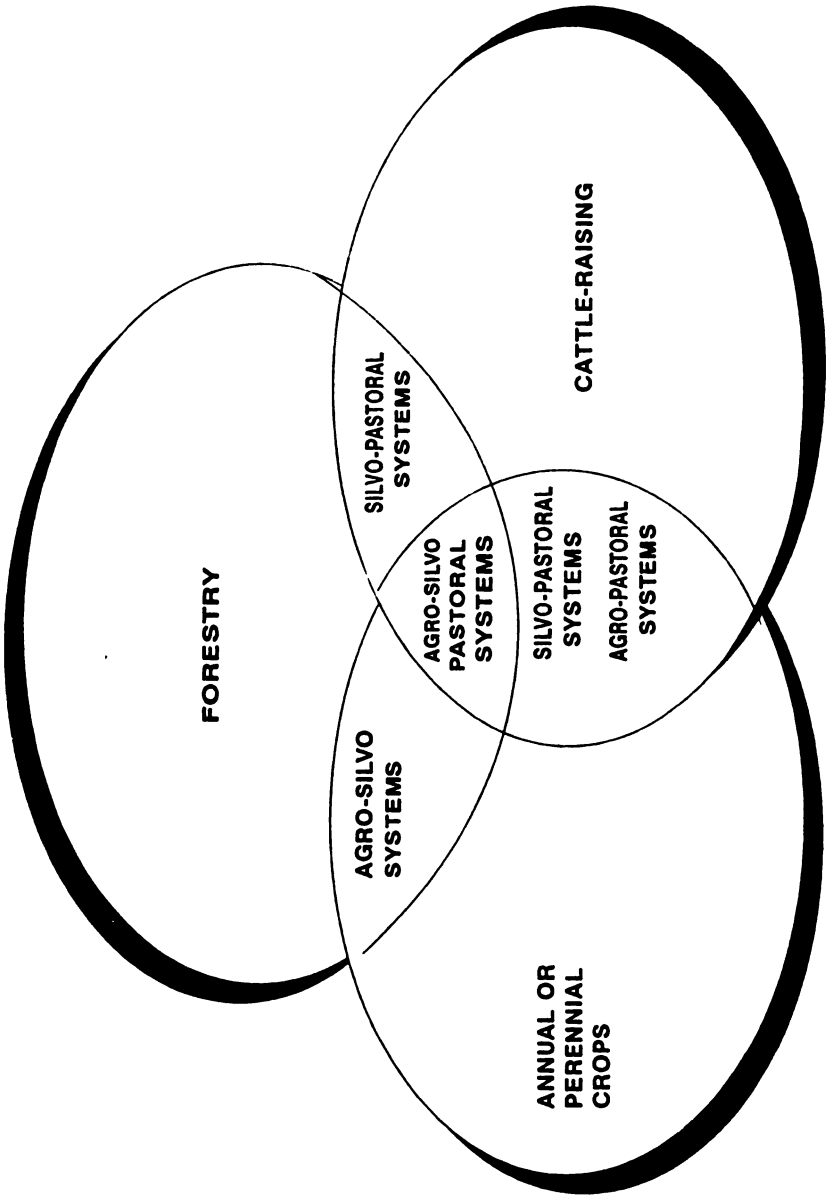


Fig. 4



In Latin America silvopastoral systems are in the early stages of development. In the Brazilian Amazon they are to be found on small or medium-sized expanses of land where Veiga and Serrao (1990) encountered various associations of fruit and timber trees with a wide range of forage grasses and legumes used for grazing cattle. However, the prospects for using silvopastoral systems to increase agricultural sustainability are encouraging. Systems of this kind are now attracting the attention of researchers and farmers due to their potential for increasing agrotechnical, environmental and socioeconomic sustainability.

Ongoing research and experimentation aimed at identifying innovative technologies and applying coordinated market systems are key factors in maintaining and increasing the sustainability of agroforestry systems. In the Brazilian Amazon, research into such systems has become so important that in early 1991 EMBRAPA (the Brazilian Institute of Agricultural Research) converted its six agricultural research units in the region into Agroforestry Research Centers.

Research activities aimed at developing more sustainable agroforestry systems should focus on the introduction and domestication of native plants and the selection of multi-use native and exotic plants of high current or potential economic value, and on the identification of comparative advantages for development and the maintenance of integrated agrisilvopastoral systems.

### ***Perennial Tree Plantations***

Perennial tree plantations are part of a broad category of plantation agriculture that includes short-rotation crops (e.g., sugar cane) and tree crops. The purpose of much of the deforestation in Latin America has been to introduce tree crops. Despite the inherent relative agrotechnical and socioeconomic limitations of land use systems of this kind, their sustainability can be increased to contribute to a more sustainable economic and socioeconomic use of deforested and degraded land and thereby ease the pressures for even more intensified deforestation.

Broadly speaking, the biophysical and socioeconomic sustainability of these plantations is relatively good (Table 1) and their expansion will largely depend on the socioeconomic conditions of the country or region where such a land use system is implemented.

Ecologically speaking, perennial tree plantations (and agroforestry systems) are desirable because they resemble natural forest in the sense that they offer efficient protection of the soil from leaching, erosion and compaction. They also perform other important biological and physical functions usually found in primary and secondary forest. The fact that perennial crops usually require fewer soil nutrients is due primarily to their efficient nutrient-cycling mechanisms, which in some ways are similar to those of natural forest (Alvim 1990).

The African palm, the rubber tree and coffee are very important perennial trees. They have a long cycle, although there are other economically important perennial fruit trees that are being cultivated relatively successfully throughout Latin America.

There are other currently and potentially important perennial forest plants (fibres, fruits, oil, resin and trees yielding medicinal products) and they should be domesticated with a view to cultivating them on homogenous plantations, or preferably as part of agroforestry production systems. This would reduce the biological and market risks that have contributed to the decline in the agrotechnical and socioeconomic sustainability of monocrop plantations in Latin America, especially in the Amazon region.

Research should focus particularly on pest and disease control for perennial crops that are currently imported, the domestication of perennial trees with the greatest potential and monocropping plantation techniques and their incorporation into agroforestry systems.

### ***Forestry Plantations***

Despite the fact that around 11 million ha. of land are presently given over to tropical tree plantations (Brown *et al.* 1986), and that these plantations have for the most part been established over the last three decades (FAO, 1991; Lanly, 1982), very few plantations are industrialized (i.e., they do not produce sawn wood, plywood or wood pulp), non-industrial with environmental purposes, or used to provide fuelwood. The species most commonly found on plantations are *Eucalyptus*, *Pinus*, *Swetenia*, *Acacia* and *Tectona* (Lugo *et al.* 1988).

Generally speaking, forest plantations in the humid tropics offer acceptable levels of biophysical and socioeconomic sustainability (Table 1). The main disadvantages are the cost involved, the expertise

required and the length of time that must transpire before products can be marketed (Wadsworth 1984).

Forestry plantations are flexible ecosystems because they have a variety of traditional uses (NRC 1993), such as timber production (cellulose, sawn wood, boards), wood products (resins, chewing gum, tannin), environmental conservation and reclamation, recreation and landscape values in rural and urban areas, and hydrology in watershed management; and non-traditional uses such as agroforestry, forage, the use of trees as windbreaks, silvopastoral systems, shade trees, energy and the reclamation of native forest.

In Latin America's humid tropics, primarily in Amazonia, forestry plantations are a recent activity (mostly set up within the last 30 years) that arose out of the need to plant forest species to ease the pressures on native forests and obtain timber products more suited to commercial purposes (Pitt 1969).

The development of forestry plantations in Amazonia has been slow despite the rapid rise in timber exports and the industrialization of the region (Yared 1990). This has mainly been due to the absence of legislation and government support and the lack of interest shown by timber enterprises in replacing the timber extracted.

There is currently insufficient data on the sustainability of forestry plantations in the region to conduct an exhaustive analysis. However, useful information on the development of forestry plantations is now beginning to emerge from commercial enterprises and research centers. Following a series of experiments carried out in eastern Amazonia, Kanashiro and Yared (1991) drew up a list of timber tree species that appear to adapt well to forestry plantations. Some of these are: acacia (*Acacia mangium*), the Guiana crabwood tree (*Carapa guianensis*), the Brazil nut tree (*Bertholettia excelsa*), cedrorana (*Cedrelinga catenaeformis*), freijo-cinza (*Cordia goeldiana*), mahogany (*Swietenia macrophylla*), the matchwood tree (*Didymopanax sp.*), parapara (*Jacaranda copaia*), guaruba-verdadeira (*Vochysia maxima*), tatajuba (*Bagassa guianensis*), the anttree (*Sclerolobium paniculatum*), tropical pines (*Pinus spp*) and tropical eucalypti (*Eucalyptus spp*).

Large amounts of data are also being generated by the commercial reforestation projects in Pará State (there are very few projects in other States) and are being passed on to the IBAMA (Brazilian Institute for the Environment and Renewable Natural Resources). In total these projects encompass around 200,000 hectares, mostly planted with

*Gmelina arborea*, *Pinus caribaea* var. *hondurensis*, *Eucalyptus deglupla* and *E. urophylla* by the Compañía Jari Florestal in a typical rain forest ecosystem, and by AMCEL (Amapá-Celulosa) in a well drained savannah ecosystem in the state of Amapá. These two cellulose-producing projects include around 90% of all forest plantations in the region. Of the promising timber species mentioned (Kanashiro and Yared 1991), only some have been used effectively on commercial forestry plantations in the region. This is probably due to the timber companies' ignorance of the findings of forestry research and their traditional utilization of certain species such as pine and eucalyptus. Another factor that limits the use of promising native species is the difficulty of obtaining seeds for large-scale operations. Guaranteeing large supplies of seeds is a problem because of the complexity of the production and seed conservation technology involved, and this obstacle will have to be overcome through further research (Kanashiro 1986).

In Amazonia, EMBRAPA conducted a series of reforestation assessments and studies on the technical viability and productivity of the species planted. The findings of these studies will be of use in drafting recommendations on ways of improving the development of forestry plantations. They will also be used by IBAMA to reevaluate current forestry legislation.

The Amazon Basin probably requires protection measures rather than large-scale reforestation (Ab Saber *et al.* 1990). However, a great deal of land has already been deforested and converted to agricultural and forestry uses and the valuable timber obtained via selective logging is becoming increasingly scarce. A sustainable forestry plantation system is needed that would make more efficient use of the large amount of deforested land in the Amazon region.

Social forestry is a variation on the forestry plantation model in the sense that it is mainly geared toward guaranteeing the diversity of family subsistence production, and directly toward diversifying plant cover and thereby ensuring the genetic diversity of local species.

Social forestry should be encouraged by distributing seedlings among farmers, especially native tree species with different uses that are endangered due to anthropic forces. In addition, this activity should be complemented with environmental education measures.

This type of land use system could actually be regarded as social reforestation. It will help create small islands of perennial trees for different uses: timber production, energy, resin, fruits, oil and even medicinal products. The species promoted and disseminated should be adapted to the interests and preferences of farmers, bearing in mind the need to conserve genetic diversity - in other words, without necessarily selecting specific plants. Social forestry could also provide an excellent opportunity for ecological bodies to work together with the interested communities.

Despite its potential for improving sustainability, the biggest obstacles to social forestry are agrotechnical (the lack of sufficient propagation material for distribution) and, to some extent, economic considerations (inadequate market conditions for the commercialization of the product) (Figure 2 and Table 1).

## **RECOMMENDATIONS ON POLICIES TO PROMOTE SUSTAINABLE LAND USE**

### **Global Strategy**

It has already been noted that a number of different land use systems and agricultural technologies exist which, were they to be properly applied, would advance the cause of more sustainable agricultural and forestry development in Latin America's humid tropics, especially in the Amazon region. Why then, have they not already been adopted on a widespread basis? And why, therefore, has deforestation not been properly managed?

If Latin American countries with humid tropical regions really wish to make progress where sustainability is concerned, they will have to acknowledge and consider the wide-range of social, agrotechnical, economic, environmental and political factors that impact land use systems. It is not merely a question of the best land use systems available. In large part, it depends on the creation of socioeconomic and political conditions that are more likely to foster the subsequent development, application and dissemination of such systems. Change should be managed through interaction and complementary action between the national and international institutions that determine government policy (NRC 1993). Policy recommendations should take account of individual, national and international needs and, wherever possible, ensure the long-term integrity of natural resources, the cornerstone of sustainable development.

The NRC's last report (1993) on agricultural sustainability and the environment in the humid tropics underlines the need for great efforts to:

- 1) Achieve more efficient management of forests and land resources.
- 2) Foster sustainable agriculture as a strategy for promoting agricultural sustainability.

In the report's view, the combination of these two aspects will provide a framework within which each country will be able to strike a proper balance between development and the use of its natural resources.

This could help ease the strong economic and demographic pressures on primary and secondary virgin forest through the improved management of agricultural systems, the diversification of agricultural production, the stabilization of shifting cultivation along the edges and on the hillsides of forests, and the reclamation of degraded and abandoned land.

It may become necessary in the near future to extend agricultural development to new expanses of forest due to new needs that may emerge. However, the technical innovations that would no doubt be used should be accompanied by policies governing their application and to protect expanses of virgin forest. Another point to be considered when drafting new legislation is the role played by highly productive agricultural land and land use systems that call for the intensive use of inputs to protect forests and stabilize degraded lands. If the productivity of degraded and abandoned land can be improved so as to make it sustainable, this will go some way to easing the pressure for expansion into marginal forest areas.

### **Forest and Land Resource Management Policies Designed to Promote Sustainable Agriculture**

The following is a list of policy recommendations drawn up by the National Research Council's Committee on Sustainable Agriculture and the Environment in the Humid Tropics (NRC 1993) that apply directly to Latin America's humid tropics and particularly to the Amazon region (the area with which the author is most familiar). For further details, the reader should obtain a copy of the publication mentioned.

### ***Policy Recommendations for Natural Forest and Natural Resource Management***

Policy reviews carried out at the local, national or international levels should bear in mind the negative agrotechnical, socioeconomic and environmental impact that previous policies have had on sustainable land use. Reviews of this kind should therefore be conducted by interdisciplinary groups.

The evaluation of the impact of agricultural and forestry development projects should be broadened to anticipate changes in land use systems and the subsequent social effects.

The role of the bodies responsible for resource management should be redefined to strike a balance between the different users of the resources concerned. Strengthening these organizations is therefore a very important aspect of cooperation between international agencies and countries in the humid tropics.

The promotion and adoption of sustainable agricultural and land use techniques should be encouraged by an equitable distribution of the costs at the world level.

### ***Policy Recommendations for the Promotion of Sustainable Agriculture***

To encourage the adoption of current sustainable agricultural and forestry systems, it is not enough to change policies that have contributed to deforestation and the degradation of natural resources in the humid tropics. Support must be provided at the different stages of development, dissemination and application. This support should consist of:

- 1) The creation of conditions conducive to sustainable production.
- 2) The provision of incentives and opportunities.
- 3) The strengthening of research, development and dissemination activities. The following recommendations are appropriate:

- ▶ Governments with humid tropic regions should promote policies that help create the conditions for the development of land use systems which make it possible to deal with the socioeconomic and environmental pressures simultaneously. For example, by granting land titles and addressing other land issues, allowing small farmers access to credit, investing in infrastructure and by encouraging decision-making at the local level.
- ▶ The governments of countries with humid tropic regions and development aid agencies should create and promote incentives to encourage long-term investment in order to increase the agricultural production of degraded land, colonize and reclaim such land, and create market opportunities for the products generated by sustainable land use.
- ▶ In order to strengthen research technologies, development and dissemination, new cooperation mechanisms must be developed between farmers, the private sector, non-governmental organizations and government entities. Mechanisms of this kind are the most appropriate means of effectively meeting the enormous research and development needs, and the need to transfer knowledge on the most complex integrated land use systems.
- ▶ Other policy issues that should be taken into account in promoting sustainable land use and mitigating the effects of deforestation in Latin America's humid tropics concern political and social stability, demographic growth, greenhouse gas emissions and alternative energy sources.

## **FOCUS OF RESEARCH AND REQUIREMENTS**

Over the past twenty years a large amount of scientific data has been generated on agrotechnical, socioeconomic and environmental issues related to agricultural and forestry development in Latin America's humid tropics with a view to meeting the region's need for more sustainable development. There is no doubt that over the last decade some of this knowledge has helped reduce the sustainability of agricultural and forestry development. Furthermore, some important



information has yet to be transferred due to the lack of suitable mechanisms.

Nonetheless, the complexity of the environment in the humid tropics continues to present a challenge to researchers and much remains to be learned if research is to properly support sustained agricultural and forestry development in the region.

Some important aspects of research policy should be reexamined. Firstly, the focus and philosophy of research should be replaced with the concept of research and development, giving priority to the resolution of the problems facing the market. This new philosophy is now being embraced by national research organizations such as EMBRAPA in Brazil.

A second aspect is the need to test and confirm the knowledge and technologies that have been developed over the past two or three decades but which have not been subjected to the demands of production systems. An analysis of this kind is necessary in order to establish the frame of reference for research activities in new areas.

A third point is that most research activity should focus on reclamation and increasing the productivity of deforested and degraded lands in Latin America's humid tropics.

Another important point stemming from the above is that research should focus on more intensive land use, harnessing scientific knowledge and capital for this purpose. This philosophy is more in keeping with the region's socioeconomic conditions.

Another important aspect of research policy is equity. In this context research organizations should do everything they can to conduct research in support of small and medium-scale farmers. Agroforestry research is important, bearing in mind its positive biophysical and socioeconomic attributes as far as sustainability is concerned and the similarity between this kind of land use and the systems that farmers use.

Lastly, another important aspect of research policy is the conservation and utilization of genetic resources as an important environmental and economic component of sustainability.

Network-based research activities are probably the most effective mechanism for achieving interaction and complementarity between government and non-governmental research organizations and tackling the factors that limit sustainable agricultural and forestry development in the region. National and international government and non-governmental research institutions should promote this mechanism.

The following are some priority needs identified by EMBRAPA and other institutions that significantly undermine the promotion of sustainable agricultural and forestry development. Research activities should therefore zero in on them. The importance of these research priorities will naturally vary from region to region and country to country.

- 1) The evaluation of natural resources (climate, soil, vegetation, water resources) to underpin rural development policies. Client: public and private sectors.
- 2) The monitoring of natural and ecological ecosystems in small watersheds. Client: public and private sectors.
- 3) The evaluation of the quality of the environment and the impact of current land use systems thereon. Client: public and private sectors.
- 4) The management of extractive resources so as to increase productivity and sustainability. Client: in the Brazilian Amazon at least 100,000 families depend on extraction activities.
- 5) The reclamation and management of degraded or abandoned land. Client: small, medium and large-scale farmers and the public sector. In the Brazilian Amazon there are at least 40 million ha. of deforested land and most of this has been degraded or abandoned.
- 6) Socioeconomic studies on the effects of land use. Client: small and medium-scale farmers and the public sector. Sociological studies are essential if we are to understand and promote sustainable land use systems.

- 7) The incorporation of plant resources for extraction into agroforestry systems. Client: mainly small and medium-scale farmers.
- 8) The domestication of native plant species so as to permit their conservation and use. Client: farmers, agroindustry and the public sector.
- 9) The development of agroindustrial technologies for native products. Client: small and medium-sized local industries.
- 10) Alternative cropping systems to stabilize shifting cultivation and thus ease the pressure on primary and secondary forests. Client: small farmers.
- 11) The development of industrial and subsistence cultivars adapted to the region's edaphic, climatic and biotic conditions. Client: small, medium and large-scale farmers.
- 12) The management and use of secondary forest. Client: small, medium and large-scale farmers.
- 13) Cropping systems for alluvial plains. Client: small farmers in alluvial plains.
- 14) Conservation and domestication of timber trees. Client: small, medium-sized and large landowners and agroindustries.
- 15) Studies on the protection of forests from pests, disease and fire damage. Client: small and large landowners.
- 16) Technologies for timber products. Client: the timber industry.
- 17) The need to improve integrated forest harvesting systems. Client: small, medium-sized and large landowners.
- 18) The conservation and protection of the germ-plasm of perennial, native and exotic plants that already are, or could be, of economic importance to the region. Client: farmers now and in the future.

- 19) Research on possible markets for the region's agricultural and forestry products. Client: farmers, the timber industry and the public sector.
- 20) The development of perennial crop production systems. Client: agroindustry.
- 21) The reclamation of degraded pastures on deforested land. Client: farmers and stock raisers. In the Brazilian Amazon alone, at least 20 million hectares of pastureland in deforested areas have been degraded to some extent.
- 22) Livestock production systems in alluvial plains and well and poorly drained savannah. Client: small and medium-scale farmers. These systems would help ease the pressure on virgin forest.

## APPENDIX 1

### PARAMETERS FOR ANALYZING THE SUSTAINABILITY OF LAND USE SYSTEMS. SOURCE: SERRAO AND HOMMA 1993.

#### *Technological Parameters*

- Demand for technical assistance
- Demand for mechanization
- Demand for fertilizers, lime, herbicides, insecticides, fungicides
- Demand for quality seed
- Demand for equipment
- Incidence of pests and disease
- Intensity of management
- Weed control
- Possibility of combining with other systems

- Fluctuations in production
- Resistance to pests and disease
- Need for organic fertilization
- Need for manpower
- Need for high degree of specialization
- Soil conservation techniques
- Ease of harvesting
- Ease of implementation
- Stability
- Productivity

***Ecological Parameters***

- Level of environmental degradation
- Receptivity of the ecological community (national, international)
- Degradation of flora and fauna
- Loss of biodiversity
- Cause of water pollution (watercourses, rivers)
- Level of deforestation required
- Level of burning required
- Long-term ecological consequences
- Farmer's present attitude to ecology
- Current level of environmental degradation caused by its use

- 
- Support of environmental institutions
  - Prospects for use on degraded lands
  - Effects on climatic changes
  - Effects on greenhouse gases
  - Possibilities of improving environmental conditions

***Economic Parameters***

- Dependence on price fluctuations
- Need for middlemen to market products
- Sound policies for the sector
- Need for credit
- Problems regarding overproduction
- Competitiveness with other activities (production systems)
- Cost of manpower required
- Cost of modern inputs (e.g, mechanization, seed, fertilizers and pest control)
- Ease with which modern inputs can be acquired
- Extension services (ease, difficulty)
- Need for research support
- Physical infrastructure (e.g., roads and transportation)
- State or national pricing policies
- Ease with which products can be marketed
- Local, regional, national and international markets

- Pressures vis-à-vis environmental protection
- Future scenarios for the Amazon region (e.g., price liberalization)
- Level of technology
- Lack of coordination between what is produced, how it is produced and for whom

### ***Social Parameters***

- Labor supply (e.g., for planting, weeding, harvesting and processing)
- Labor-intensive activities (e.g., logging)
- Educational level required for a farmer or laborer
- Years of experience required
- Immigrants from other regions
- *Mutirao* practices
- Income level required
- Adequate social infrastructure (e.g., schools, health centers and social clubs)
- Interaction between producers (e.g., Japanese and rubber planters)
- Strong political involvement (lobbying capacity)
- Manpower also used in other agricultural activities (e.g., small farmers that also work weeding pastures on large neighboring cattle ranches)
- Mobilization
- Equity

### ***Cultural Parameters***

- Dependence on cultural traditions (e.g., Bahia farmers and cocoa, and Sao Paulo farmers and coffee)
- Cultural setting versus adoption of technology
- Fear of being the first to try something (wait for others to do it)
- Extension services that are familiar with the ecological and socioeconomic environment
- Narrowness of outlook
- Mix vis-à-vis farmers' backgrounds
- Strength of political leadership
- Access to local, regional and national news
- Access to newspapers and magazines
- Time devoted to agricultural activities
- Familiarity with daily life in the Amazon region.

### **REFERENCES**

- Alvim, P.T. 1990. Agricultura apropiada para uso contínuo dos solos na região Amazonica. Espaço, Ambiente Planejamento 2(11):1-71.
- Brazilian Institute of Space Research. 1990. Avaliação da Cobertura Florestal na Amazonia Legal Utilizando Sensoriamento Remoto Orbital. Sao Paulo: Brazilian Institute of Space Research.
- Brown, S.; Lugo, A.E.; Chapman, J. 1986. Biomass of tropical tree plantations and its implications for the global carbon budget. Can. J. Forest Res. 16:390-394.



- Brown, S.; Lugo, A.E. 1990. Tropical Secondary Forests. *J. Trop. Ecol.* 6:1-31.
- Bunyard, P. 1987. The significance of the Amazon basin for global climatic equilibrium. *Ecologist* 17 (4/5):139-141.
- Ehrlich, P.R.; Wilson, E.O. 1991. Biodiversity studies. Science and policy. *Science* 253:758-762.
- Fernandes, E.; Serrao, E.A.S. 1992. Prototipo e modelos agrossilvipastoris sustentáveis. In *Seminário internacional sobre meio ambiente, pobreza e desenvolvimento da amazonia (SINDAMAZONIA)*, 1992, Belém. Anais. Belém: PRODEPA. p. 245-304.
- Food and Agriculture Organization and United Nations Environment Programme. 1991. *Forest Resources of Tropical Africa, Asia and the Americas*. Rome, Italy: Food and Agriculture Organization of the United Nations.
- Forest Resources Assessment 1990 Project. 1990. Interim Report on Forest Resources Assessment 1990 Project. Item 7 of the Provisional Agenda presented at the Tenth Session of the Committee of Forestry of the Food and Agriculture Organization of the United Nations, Rome, Italy, September 24-28, 1990.
- Hecht, S.; Cockburn, A. 1989. *The Fate of the Forest*. London: Verso.
- Kanashiro, M. 1991. Some important biological issues affecting tropical rain forest silviculture. Submetido à Comissão Técnica do 1º Congresso Florestal Mundial a ser realizado em Paris, 17-26.09.91. 8pp.
- Kanashiro, M.; Yared, J.A.G. 1991. Experiências com plantas florestais na Bacia Amazônica. In *O Desafio das Florestas Tropicais*. Univ. Rual do Paraná. pp. 436.
- Lanly, J.P. 1982. *Tropical Forest Resources*. Forestry Paper No. 30. Rome, Italy: Food and Agriculture Organization of the United Nations.
- Lean, G.D.; Hinrichsen \_\_; Markham, A. 1990. *Atlas of the Environment*. New York: Prentice-Hall.

- Lugo, A.E.; Brown, S.; Chapman, J. 1988. An analytical review of production rates and stemwood biomass of tropical forest plantations. *Forest Ecol. Manage.* 23:179-200.
- National Academy of Sciences. 1980. *Research Priorities in Tropical Biology*. Washington, D.C.: National Academy of Sciences.
- National Research Council (NRC). 1992. *Ecological Aspects of Development in the Humid Tropics*. Washington, DC. National Academy Press.
- \_\_\_\_\_. 1993. *Sustainable Agriculture and Environment in the Humid Tropics*. National Academy Press. Washington, D.C. 702.
- Nepstad, D.C.; Uhl, C.; Serrão E.A.S. 1991. Recuperation of a degraded Amazonian Landscape: Forest recovery and agricultural restoration. *Ambio* 20(6):248-255.
- Pitt, J. 1969. *Aplicação de métodos silviculturais a algumas florestas da Amazônia*. Belém, SUDAM, 245pp.
- Population Reference Bureau (PRB). 1991. *World Population Data Sheet 1991*. Washington, D.C.: Population Reference Bureau.
- Repetto, R.; Gillis M. (eds). 1988. *Public Policies and the Misuse of Forest Resources*. Cambridge, U.K.: Cambridge University Press.
- Serrão, E.A.S. In press. *Deforestation for Pasture in the Humid Tropics. Is it Economically and Environmentably Sound in the Long Term?* International Grassland Congress. 1993. New Zealand/Australia.
- \_\_\_\_\_; Falesi, I.C.; Da Veiga, J.B.; Neto, J.F.T. 1979. Productivity of Cultivated Pastures on Low Fertility Soils in the Amazon of Brazil. Pp. 195-225. In *Pasture Production in Acid Soils of the Tropics*, P.A. Sanchez and L.E. Tergas (eds) Cali, Colombia: Centro Internacional de Agricultura Tropical.
- \_\_\_\_\_; Toledo, J.M. 1990. The search for sustainability in Amazonian pastures. Pp. 195-214 In *Alternatives to Deforestation: Steps Toward Sustainable Use of Amazon Rain Forest*, A.B. Anderso (ed) New York: Colombia University Press.

- \_\_\_\_\_; Toledo, J.M. 1992. Sustained pasture-based production systems in the humid tropics. In Hecht, S.P. (ed). *Development or Destruction. The Conversion of Tropical Forest to Pasture in Latin America*. Westview Press. Boulder, Colorado. pp. 257-280.
- \_\_\_\_\_; Homma, A.K.O. 1993. Brazil. National Research Council (ed). *Sustainable Agriculture and the Environment in the Humid Tropics*. National Academy Press, Washington, D.C., p. 265-351.
- Subler, S.; Uhl, C. 1990. Japanese agroforestry in Amazonia: A case study in Tomé-Açu, Brazil. Pp. 152-166. In *Alternatives do Deforestation: Steps Toward Sustainable Use of the Amazon Rain Forest*, A:B: Anderson (ed). New York: Columbia. University Press.
- Veiga, J.B.; Serrão, E.A.S. 1990. Sistemas silvopastoris e produção animal nos trópicos úmidos: A experiência da Amazônia brasileira. Pp. 37-68 in *Pastagens*. Piracicaba, Brasil: Sociedade Brasileira de Zootecnia.
- \_\_\_\_\_; Hebbette, J. 1992. Produção sustentada da agropecuária integrada. In *Seminário internacional sobre meio ambiente, pobreza e desenvolvimento da amazonia (SINDAMAZONIA)*, 1992, Belém. Anais. Belém: PRODEPA. p.280-284.
- Wadsworth, F.H. 1984. Secondary forest management and plantation forestry technologies to improve the use of converted tropical lands. Paper commissioned by the Office of Technology Assessment. U.S. Congress, Washington, D.C.
- Yared, J.A.G 1990. A atividade florestal na Amazônia: Diagnósticos e Perspectivas. Palestra apresentada no Seminário Futuro Econômico da Amazônia: Agricultura, realizada no Senado Federal, no período de 23 a 24.05.90, mimeo. 23pp.

# FORESTRY POLICY AND DEVELOPMENT: THE CHILEAN EXPERIENCE<sup>1</sup>

Hernan Cortes S.<sup>2</sup>  
Ignacio Cerda V.<sup>2</sup>

## PURPOSE

This document discusses the circumstances and conditioning factors that, at the national and sectoral levels, could account for the rapid development of the Chilean forestry sector in recent years.

This paper is not the result of scientific research into forestry policy and development, but rather reflects the authors' thoughts on the subject. For the past three decades they have participated in the growth of this productive sector, in very different roles.

The document sets out to provide, firstly, an historical overview of the activity and a summary of the current status of the forestry sector; this is followed by an analysis of forestry and development policy, focusing on the underlying variables involved and the challenges facing the activity.

## HISTORICAL OVERVIEW

Chile is undoubtedly a "forestry-oriented country", considering that 44.6% of its territory (33.8 million hectares) is made up of land with no other potential use besides forestry. Nonetheless, Chile is not a country with a forestry tradition. In fact, this lack of a forestry tradition has held back the sector's development.

While it is true that trees and forests have played an important part in our history, it has been only relatively recently that society has grasped the fact our forests represent a renewable natural resource that could make an important contribution to the nation's economic and social development.

---

<sup>1</sup> This document was prepared specially for the Regional Workshop on and Needs and Priorities for Forestry and Agroforestry Policy Research for Latin America CIFOR/IFPRI/IICA and is intended to provide an overview of Chile's forestry experiences from the historical, quantitative, political and forestry development standpoints.

<sup>2</sup> Head, Economic Studies Division, Forestry Institute, Santiago, Chile.

Following the conquest of Chile (1541), the country's forests were regarded as an impenetrable natural fortress that protected the indigenous population and, therefore, actually hindered the pacification of the country (basically the south). As a result, large areas of forest were put to the torch by the Spanish Conquistadors in order to deprive their enemies of a place of refuge. The pacification of the "Araucanía" (indigenous population) and the consolidation of national sovereignty was completed as recently as the end of the last century.

Chile's vast, uninhabited tracts of land had need of citizens who were ready to take up the challenge of settling inhospitable regions. The colonizing legislation enacted in 1845 prompted a massive influx of German settlers. For them to survive in the forested regions of the south it proved necessary to push back the agricultural frontier. At that time the forest was viewed simply as an obstacle to agriculture, and to civilization in general. As a result, huge expanses of forest were burnt off, something that seems quite incomprehensible to us today.

In those days the practice was to log all the best and most valuable trees and burn off the remaining vegetation. Once the land had been cleared, it was used for agriculture. The process was successful when practiced on land really suitable for agriculture, creating a rich agricultural and livestock region in the south of the country. However, the need for more agricultural land, which led to the deforestation of mountains and hillsides without soil fertilization and with very little crop rotation, produced the greatest erosion that the country has ever seen. So severe was the effect that the problem only began to abate in the second half of the 20th century. The indiscriminate use of wood for fuel is also a long-standing problem in Chile and another reason for the destruction of native forests.

Historical analysis suggests that forestry policy in Chile, and the resulting legislation, was greatly influenced by the contingent issue of the destruction of the forest and the serious erosion that this caused. The forestry policy of successive governments was mainly intended to halt and reverse the process through a series of legal provisions that regulated or prohibited logging and encouraged afforestation on land with forestry potential through the granting of tax allowances. The first law designed to protect the nation's forests dates from 1872. In 1879, a decree established fiscal forest reserves for the first time in our history. The year 1925 saw the enactment of a law authorizing the creation of national parks, this time with the clear and explicit

purpose of preserving areas of natural forest from any kind of human intervention.

The 1931 Forestry Act, regarded as the nation's first real piece of forestry legislation, incorporated all the previous legal provisions on the subject and a new one that would have a decisive impact on forestry development in Chile: it exempted the owners of land suitable for the planting of trees from the payment of all taxes for a thirty-year period.

The Monterrey pine, a native of California, reached our shores 108 years ago, included by mistake in a shipment of other conifer seeds ordered by a farmer in the Concepción region who was given to conducting forestry experiments on his land. Everyone was amazed at this pine's inordinate rate of growth and the ease with which it adapted to the environmental conditions in Chile.

Later, between 1907 and 1912, the *Compañía Carbonífera e Industrial de Lota* (now called the *Empresa Nacional del Carbón*), planted 400 hectares on the hills surrounding its mine to provide a future supply of wooden posts, a use for which it would actually prove ill-suited.

Renewed interest was shown in this pine species in the 1930s, when its wood was used successfully to manufacture pulp and paper and produce sawn wood for packing crates and construction. In the late 1930s, some 8-10,000 ha. were planted every year, marking the beginning of the massive reclamation of forest soils spurred by the tax breaks granted under the 1931 Forestry Act.

In fact, the high growth rates offered by these plantations, allied to the progressive exhaustion of native forests due to selective overlogging and the expansion of the agricultural frontier, paved the way for commercial timber harvesting to be extended from the forests to the plantations of Monterrey pine.

The shift in timber production away from native forest and toward the plantations gathered momentum from 1965 onward; prior to this timber production was concentrated in the native forest and consisted mainly of sawn wood. From that year onwards, however, industrial activity began to expand with the emergence of new plywood and pulp plants that made extensive use of the Monterrey pine plantations.

This industrialization process delighted many owners of forest lands that had been subjected to large-scale afforestation with the help of government agencies, through agreements with landowners, soft credit, etc.

The year 1974 marked an important turning point in the country's development strategy. The existing strategy, promoted mainly by the Economic Commission for Latin America (ECLAC) and based on import substitution and policies aimed at developing domestic industry, was replaced with a strategy of full liberalization and economic opening. This favored economic development based on the country's comparative advantages and the anticipated benefits of a complete globalization of the economy. Integration into world markets and their respective price structures would ensure the most efficient allocation of resources to the different production processes and eliminate the distortions created by protectionist measures. The State was to take a back seat, with responsibility for production being left in the hands of the private sector.

Under this new development strategy, forestry was identified as one of the production sectors in which Chile possessed the greatest comparative advantage (availability of soils with forestry potential, species capable of rapid growth already adapted to local conditions, availability of human resources, etc.) and, consequently, as one of the production sectors around which the country's future economic development should be built.

One corollary of this shift in policy was the enactment of Decree Law 701 of 1974, which basically fostered the production of forest resources on the thousands of hectares of land with forestry potential but without tree cover that existed in the country at the time, by directly subsidizing reforestation.

Decree Law 701 and the modernization of the country which began in the mid-1970s account for the rapid expansion of this sector in recent years.

Meanwhile, as has already been noted, between 1965 and 1988 industrial production from native forest stagnated and was used primarily for fuelwood and continuing its natural degradation.

There were economic reasons for this. The production costs involved in the use of natural forest rose steadily, mainly due to the low level of logging, accessibility and the absence of technologies.

In short, the lack of basic and applied research and technology transfer in forestry areas and the low level of utilization led to a decline in the value of native forest.

The stagnation in the development of Chile's natural forest was due to the lack of silvicultural intervention, which was not justified due to the meager financial returns. This continues to be the case.

As in many countries, current Chilean legislation is heavily biased toward soils and their use when under forest cover, but not soils where the trees have been felled, despite the fact that the latter are the most susceptible to damage.

As a result, the basic problems that need to be resolved are: how can natural protected forests be conserved in their present state? How can sustainable production practices be introduced into forest that is capable of being used in this way? And how can exposed soils with forestry potential be reforested?

In 1988 some exporters began to sell wood chips obtained from native timber and it was this that pushed the long-forgotten natural forest timber resource to the forefront of the national debate on an ad hoc forestry policy.

This issue has been debated for years by the players involved, without any real progress being achieved. A bill is now before parliament, but it appears unlikely that it will obtain the votes needed for it to pass into law.

A consensus has developed on certain key issues concerning native forest, such as the fact that:

- ▶ Its present state of degradation is the result of indiscriminate use, which is both the cause and effect of the sharp decline in the size and quality of forest.
- ▶ It has played a marginal role in the growth of the national forestry sector.



- ▶ For the above reasons, this resource should be integrated into production, but on a sustainable basis.

## **THE FORESTRY SECTOR IN NUMBERS**

At present there are 1.55 million ha. of productive forest, composed mainly of Monterrey pine and eucalyptus and 7.62 million ha. of potentially productive but severely degraded natural forest. This deterioration is due to both overmaturity and selective logging.

Most forest lands and productive forests are in private hands. The State currently owns around 3% of all plantations, including 20,000 ha. of mesquite and 12,000 ha. of Monterrey pine (under agreements with individuals). While the State owns 13.8 million ha. belonging to the National System of Protected Wildlife Areas (SNASPE), only 1.9 million ha. are forested, including 1.5 million ha. of protected forest located for the most part in Regions XI and XII. The rest are made up of deserts, steppes, glaciers, high mountains, etc.

The Chilean Forestry Sector contributes 3.1% of GDP and 11% (US\$ 1,200 million) of total exports. It also provides direct employment for over 100,000 people.

The logging/growth ratio is a healthy 1:4. In 1992 net surplus volume stood at 15.9 m<sup>3</sup>/year. Over the next few years supplies of the resource will therefore make it possible to double current production.

The value of the nation's forest assets is put at US\$ 11,200 million (industry and forest), and this figure will rise by some 25% over the next three years due to the implementation of mega-projects in the cellulose, plywood and sawmill fields.

### **Overall Situation**

The strength of the Chilean economy, particularly in terms of inflation and interest rates, has stimulated domestic demand for forest products. As we all know, lower (especially long-term) interest rates, lead to higher investment. As far as the forestry sector is concerned, this is particularly important for the construction industry, the main consumer of timber products.

Lower interest rates stimulate development and encourage consumers to build or purchase properties or durable products, setting in motion a chain reaction that increases the demand for logs, though this varies in strength according to the structure of the market of the subsector involved.

In addition to the generally favorable economic environment that accounts for the trend in the prices of forest products, there is also a special situation regarding the supply of standing timber of Monterrey pine, which will double in 1995.

In addition to the domestic situation, the structural changes that the world's timber-producing countries are undergoing (which appear to be connected with falling supplies of the raw materials used by the forestry industry, especially in the US and Canada) have caused the price of both sawlogs and pulpwood to rise sharply. This trend was quite marked during the second half of 1992 and the early part of 1993.

We are beginning to see the fruits of recent investment in heavy equipment for pulp, plywood manufacture, sawing and processing. It has generated higher demand for pulpwood, logs and chips, which has also pushed up prices in this market and will give the development of the forest production business a big boost.

Over the period 1993-1996 new projects will be implemented to the tune of US\$ 2,400 million, based mainly on the supply of timber from Monterrey pine plantations, which is set to double.

The following table presents a statistical summary of the industry, together with the compounded rates of growth during the 1980s and 1990s (Table 1) and a series of figures highlighting trends in this sector.

Table 1. Executive Summary of Forestry Sector Indicators

Exports	Return	Growth %	
	1992	(US\$ mill FOB)	
		1982/1992	1990/92
TOTAL	1,126	13.0	14.7
Chemically produced pulp	529	11.9	28.7
Pulp for newsprint	57	7.7	-5.7
Sawn wood	113	5.9	-8.9
Processed timber	319	54.9	-10.3
Sawlogs	49	2.8	-2.0
Logs for pulp	11	-	-30.5
Uncut chips	164	-	22.5
Plywood and veneer plywood	35	13.9	24.6
Paper and cardboard	92	8.8	6.2
Other products	102	26.6	18.0

Production	Volume	Growth%	
	(thousands) 1992	1982/92	1990/92
Chemically produced pulp, t	1 499 000	10.5	52.5
Mechanically produced pulp, t	181 000	4.6	6.4
Paper for newsprint, t	161 000	2.6	-3.0
Other paper and cardboard, t	347 000	9.1	9.2
Sawn wood, m3	3 019 095	9.9	-4.7
Particle boards, m3	239 790	15.6	16.0
Fiberboards, m3	160 540	13.9	15.1
Plywood, m3	57 170	18.9	18.9
Veneer plywood, m3	19 710	9.4	48.8

Table 1. (Cont.)

Consumption of logs by industry (m <sup>3</sup> /sec)	Volume (thousands) 1992	Growth, %	
		1982/92	1990/92
Pulp	6 986	9.6	64.1
Sawing	6 450	10.2	-4.0
Plywood and veneer			
plywood	697	11.2	7.0
Chips	3 088	-	17.2
Logs Export	1 288	3.7	-10.7
Other	297	-	23.3
<b>TOTAL INDUSTRY</b>	<b>18 805</b>	<b>11.4</b>	<b>14.8</b>

Forest Resource	Surface Area (thousands ha.) 1992	Growth %	
		1982/92	1990/92
Plantations	1 572 1	6.0	0.5
Timber-yielding forest	9 188 6	-	-
Native forest	7 616 5	-	-
Wildlife areas	13 834 5	-	-

## FORESTRY POLICY AND DEVELOPMENT

The implementation of clear, stable macroeconomic and sectoral policies is of paramount concern to the business community. Without stability there is no investment, especially the long-term investment that forestry requires; and without investment, there is no productive activity.

Chile has decided to lend its unqualified "support to private enterprise" and to the operation of a "free market system", minimizing the direct action of the government in "productive activities", (the State takes a back seat). This clear definition of roles has created very favorable conditions for investment in the Chilean forestry sector.

Under this arrangement, private enterprise is to play a leading role in creating and developing business opportunities, implementing the principles on which its activities are based. For its part, the Government must create the conditions for attaining the goals of national development, with social equity and environmental harmony.

While it is true that the development of the Chilean forestry sector over the past twenty years has been impressive, it did have some basic comparative advantages: the availability of an abundance of well-located land with forestry potential; species capable of rapid growth, such as Monterrey pine and eucalyptus, already well adapted to local conditions; cheap labor costs in international terms; the incorporation of tried and proven technologies and the development of an extensive network of international sales and contracts. However, today we are faced with a situation that has gradually grown more difficult, in the sense that comparative advantages have been superseded by others that entail costs or differentiation and competitive advantages that must be permanently safeguarded. We are entering a new phase in which we will have to redouble our efforts to remain competitive, especially in the international marketplace.

Nonetheless, this competitive advantage is not the same as the array of competitive advantages that may be developed by any enterprise directly involved in the production and export process. An analysis of the cost structure of the enterprises currently operating in this sector confirms that many of the costs are beyond their control (the inadequacy of the road network and port facilities; exchange rate policy; educational policy vis-à-vis training for both unskilled workers and professionals, etc.). We mean, therefore, a "structural competitive advantage" that encompasses the entire system within which these firms operate and which establishes the conditions required for attaining the specific development goals of the forestry sector.

We feel that it is worth commenting on certain national and sectoral policies that are critical to the "competitiveness" that the Chilean forestry sector must achieve if it is to continue to develop as successfully as it has hitherto.

## **THE RETURNS**

### **Freedom to Export Raw Materials**

It is essential that a policy of complete opening to the world market be maintained, permitting the export of forest products, whether processed or otherwise, to make optimum, full use of the nation's forestry potential.

The opening up of the economy to foreign competition via price adjustments results in an efficient allocation of inputs and, therefore, in the development of economically competitive enterprises. At the same time, it ensures that industrial forestry development does not benefit artificially from the forced subsidy created by limiting exports of raw materials. Undoubtedly, the freedom to export sawlogs following the lifting of restrictions in 1975, and the opening up of the export market in pulpwood (sawlogs and chips) in 1986 gave a very considerable impulse to the development of the Chilean forestry sector.

### **Non-Traditional Exports**

With the development of the Chilean forestry sector being geared toward world markets (due to the limited domestic market - a small population in proportion to the nation's forest resource base), the diversification of exports in order to gain access to different segments of the market becomes a key consideration. Therefore, stimulating exports of non-traditional products provides an important incentive to the expansion of such exports. Thus it was that in 1985 a law was passed (Ley No. 18,480 of the Ministry for the Economy) establishing a 10% rebate on the value FOB of non-traditional products.

Export products that have benefitted from the 10% rebate and in a calendar year do not exceed US\$ 7.5 million are entitled to a 5% rebate based on the value FOB. This latter percentage cushions the gradual loss of the benefit. The list of products that do not qualify is determined on a year-to-year basis by the Ministry for the Economy and the Ministry of Finance. The existence of this incentive for non-traditional exports is the main reason why Chile now exports over 380 different forest products to markets around the world.

## **Exchange Rate Policy**

Based on the sustainable development of most of the nation's soils, the present and potential supply of forest products, given Chile's small population, far outstrips domestic demand. This means that the Chilean forestry sector will always be geared toward export markets, and the exchange rate therefore plays a key role in the success of the business.

Accordingly, the authorities responsible for the economy must ensure that exchange rates for the currencies of the purchasing countries and the Chilean peso are held to levels which make our exports competitive.

Over the past year, the value of the Chilean peso has fallen steadily, to a point where in many cases it adversely affects the competitiveness and marketability of our products abroad. It is up to the authorities to find creative solutions and introduce timely measures to deal with this issue, which is no longer a temporary problem but a determining factor in the success or failure of the firms involved and threatens to push up unemployment.

## **Strengthening of Marketing Strategies**

There is no doubt that the development of the Chilean forestry sector will continue to be closely linked to the international market. Exports of our products will continue to be the key to, and the driving force behind, that development.

Nor is there any doubt that the world market in forest products will continue to be dominated by the developed nations, whose bargaining power far exceeds that of their forestry concerns, which in any case are considerably stronger than our own. We sell to, and compete with, transnational conglomerates whose capacity to plan is, generally speaking, greater than our own. In addition, they are in a better position to cope with the cyclical downturns in the world market as Chile accounts for only 1% of total world exports of forest products.

Our relative weakness, both as exporters and as a nation, has spurred us to seek coordinated actions by Chilean forestry enterprises through the creation of consortia of exporters which have already

proved to be very successful in our country. The same has occurred in regard to coordinated action involving other countries with similar problems and the shared concerns. In the latter case, the formation of cartels is not advisable, but at least closer ties between the different countries as a first step toward more consistent actions in the future. The holding of annual conferences to address issues of common interest has so far proven to be very useful.

Coordination of this kind must also be effective and harmonized with the government agencies that represent the nation's interests in dealing with the different international fora where bilateral and multilateral agreements are discussed. The export of forest products should be viewed as a matter of national concern that calls for the greatest possible cooperation and support from the Government. While there is room for improvement, the efforts of the Organization for the Promotion of Exports (PROCHILE) are a step in the right direction.

It must also be borne in mind that in the future commercialization faces the challenge of diversifying products and markets. Therefore, we should research and develop segments of markets that will enable us to establish ourselves and grow successfully, and pinpoint clients' needs and satisfy them by creating new products. In this effort we shall be called upon to play a leading role in "technological research and development."

### **Other Economic Policy Instruments**

Forestry development has resulted from the modernization of the country in key areas of the forestry environment.

There are other economic policy instruments besides those mentioned:

### **Technology Policy Instruments**

- ▶ Fondo Nacional de Desarrollo Tecnológico y Productivo (FONTEC), which finances projects involving technological innovations and research infrastructure and the modernization of production.
- ▶ Fondo de Fomento al Desarrollo Científico y Tecnológico (FONDEF-CONICYT), which finances



research and development of products and services for immediate transfer.

### **Export Promotion Policy Instruments**

- ▶ Rebates of customs taxes and duties paid on imported raw materials and inputs used to produce goods that are subsequently exported.
- ▶ Deferred payment of customs duties and fiscal credit for capital goods.
- ▶ Repayment of the tax on aggregate value to exporters.
- ▶ Statistical and market information systems.
- ▶ Financing and promotion of investment for medium and small-scale farmers.
- ▶ Skills improvement and entrepreneurial training.

### **THE COSTS**

#### **Afforestation Subsidies**

Chile's plantations of Monterrey pine and eucalyptus have been the key to its forestry development. The first of these were planted many decades ago, but underwent their greatest period of growth following the enactment of Decree Law 701 in 1974.

Initially, Decree Law 701 established a subsidy equivalent to 75% of the cost of planting trees on soils adjudged by the Forestry Service to have forestry potential. In addition, it lowered land and income taxes for these new plantations. Law 701 also provided a subsidy for the management of plantations in order to encourage owners to improve the quality of the raw materials obtained from these forests. This in turn boosted the production of goods with more added value which were more competitive in the world marketplace.

In domestic terms, the ultimate aim of Law 701 was to create a sizable forest stand that, as a renewable natural resource, would serve as the cornerstone of a forest products export industry that would make an important contribution to the nation's economic and

social development. The abundance of soils unsuitable for other uses, the availability of unemployed or underemployed manpower, the opportunity to reclaim sandy soils or halt erosion on soils exhausted by agricultural overexploitation and thus create immense future wealth at low cost and with a big regional impact - all these factors made the plan very attractive in social terms.

Nonetheless, most of the plantations harvested to date were set up prior to the enactment of Law 701. There is no doubt that the successful opening up of the economy and the existence of stable markets that enthusiastically welcomed Chile's forest products was also a critical factor which, allied to the subsidy granted under the Law, account for the 1.5 million ha. of forest plantations that exist in Chile today. Proof of this is the fact that to all intents and purposes a single species - Monterrey pine, whose industrial uses were well-known (raw materials for cellulose, paper, sawn wood) - was planted, and that most of the afforestation has been carried out by firms which were already familiar with, and in fact largely controlled, the forestry business in Chile, (mainly the pulp and paper industry).

Another, more recent confirmation of this point has been the large-scale planting of eucalyptus over the past four years, following the opening up of the Japanese market to Chilean short fiber chips.

The end result is that where forestry is concerned Chile possesses an enormous forest stand produced at low cost and with many positive externalities which place it in a very good position to compete in world markets.

With regard to the application of the forestry subsidy, it is worth noting that between 1974 and 1991 the Government invested US\$ 112.5 million in the planting of 642,547 ha. The current market value of these plantations is over US\$ 1,400 million, demonstrating the increase in the country's forest wealth. When these plantations are harvested they will generate taxes, foreign exchange, employment, investment and other externalities.

### **Highway and Port Infrastructure**

While it is true that hitherto Chile has enjoyed the advantage of being able to produce massive amounts of raw material at low cost, it is also true that the great distances that separate it from the main consumption centers (markets) for forest products and the inadequacy

of its highway and port infrastructure seriously undermine its competitive advantage at world level.

Over the years, public investment has been channeled into eradicating the bottlenecks caused by the inadequate road and rail network and creating efficient port facilities. However, investment has failed to keep pace with the sector's rapid development resulting from private investment in industrial expansion. The issue of investment in infrastructure has been debated regularly over the past ten years by the private and public sectors to determine who should foot the bill. Recently it was concluded that the only solution would appear to be to leave as much as possible in the hands of private investment, without precluding increased government investment as the country continues to develop.

This understanding between the private and public sectors has recently had positive results, as demonstrated by the construction of new bridges financed with private investment. There are also high expectations following the recent decision to privatize the state-owned railways' freight operations.

### Foreign Investment

As a result of the opening up the economy to world trade and the enactment of legislation to foster afforestation (DL-701), large sums have been invested in forestry by national and foreign firms over the past ten years. The total amount involved is reckoned to be over US\$ 3,500 million, chiefly in the areas of pulp, the manufacture of wood products and port facilities. Besides making an important contribution to expanding the country's productive capacity and thereby increasing the utilization of its forestry potential, this investment has also opened up a big new source of business opportunities. It has created a demand for a variety of goods and services that must be satisfied and, through a multiplier effect, will generate new investments in the process.

As far as foreign investment is concerned, Chile's policy has been to accord foreign investors the same treatment as local ones, and in some instances even preferential conditions.

Since 1985 it has been possible for foreigners to invest in Chile under the provisions of Chapter XIX of the *Compendio de Normas de Cambios Internacionales*, using Chilean external debt instruments.

Such operations may only be carried out by Chilean or foreign natural or legal persons resident abroad, provided that they are authorized by the Central Bank and the investment is made in the form of local currency.

The value of Chilean external debt bonds fluctuates and they are traded at prices significantly lower than their parity price. These securities are converted by the Central Bank to Chilean pesos using a preferential exchange rate which affords the investor an immediate profit of around 12-15% on the original cost of the security, which is the system's chief advantage.

Under this system of foreign investment, the pesos obtained therefrom can only be used for specific investments authorized previously by the Central Bank. The latter conducts a case-by-case analysis in order to ensure that these operations pertain to productive activities that create higher employment, substitute imports, and generate exports and, therefore, foreign exchange. Generally speaking, all these conditions apply in the case of forestry enterprises.

There is no doubt that the preferential treatment granted to foreign investors has been a very positive underlying factor in the development of the Chilean forestry sector. One example of this is the Santa Fe project, which works with a short fibre pulp plant, with eucalyptus.

### **Training, Productivity and Technology**

In the past, the low cost of labor and land with forestry potential were important factors in the competitiveness of the Chilean forestry sector in international markets. Today the cost of both has risen sharply. Labor costs are expected to continue to rise as the country attains a higher level of development, but it will be the cost-productivity ratio that will ultimately determine the sector's competitiveness.

The increased productivity required will make it necessary to intensify efforts to develop a good employee training and education policy. This is the key to achieving this productivity goal, as well as the modernization of our industry, through technological innovation and mechanized and automated production. This question assumes particular importance as Chile enters the second phase of the export process - "products with added value".

## The Environmental Issue

While the term "sustainable development" may be on everyone's lips today, interpretations of the concept vary. Whenever the use of our natural resources (in our case, especially the future of the native forest) is discussed, the thorny issue of development and conservation as two mutually exclusive goals rears its head. In our country, as in many others around the world, it is an issue that remains unresolved. Consequently, the Government has preferred to adopt an extremely cautious position, resulting in a series of regulations that have proven to be difficult and very expensive to implement. Moreover, the environmental issue raises questions about the sector's future, including the future of the plantations, and producers are justifiably concerned about whether "rights of ownership" over these resources will be respected. There is a risk that the plethora of regulations that tend to tie up the forest resource (without compensating the owners) will discourage investment in this activity and lead, in turn, to neglect these resources, which will then be exposed to the danger of greater destruction.

The issue of new forestry legislation to protect Chile's native forest will have to be settled soon; if not, we risk forfeiting the achievements of the past.

## CONCLUSION

The foregoing catalog of conditioning factors that have contributed to forestry development is not exhaustive. It is also more than likely that other aspects of macroeconomic and sectoral policy have played an important role in the development of this productive sector in recent decades. What is clear is that the sector's development has been due to the combined effect of a series of policy decisions adopted at national and sectoral level which created a highly favorable environment that set the country in general, and the forestry sector in particular, firmly on the road to development. In short, in the early 1970s the decision to implement a new development strategy led to a significant change of attitude on the part of the people, awakening in them an aggressive and go-ahead entrepreneurial spirit that had lain dormant for many years and which was crucial to the development that followed.

No one can deny that during the 1970s the State created and maintained a macroeconomic framework that stimulated development

by: establishing clear, stable game rules (role of the state *versus* the role of the private sector); ensuring full respect for ownership rights; opening up the economy; providing responsible and sound economic management (inflation, external debt, labor legislation, etc.); reducing red tape; and encouraging investment. The State also took pains to create a macroeconomic-sectoral framework that was conducive to forestry development, (DL-701, export incentives, etc.), all of which contributed to the results achieved in recent years. Despite all that has been accomplished, however, clouds are beginning to gather on the horizon, suggesting that the future development of the forestry sector will not be plain sailing. We should like to think that, as was suggested at the beginning of this paper, this is due to the fact that Chile as a country has yet to develop a "forestry mentality."

# THE ROLE OF FORESTRY AND AGROFORESTRY IN SUSTAINABLE HILLSIDE DEVELOPMENT

Carlos J. Rivas<sup>1</sup>

## INTRODUCTION

It is evident that most Latin American countries are plagued by the problem of poor hillside management. There are many reasons for this and the purpose of this document is to identify some of them in the Latin American context.

It is not difficult to demonstrate that forestry and agroforestry techniques are the solution as far as the sustainable development of hillsides in most of Latin America is concerned. At this point in time, however, it is important to consider why a solution that is so obvious to the technical-scientific community is not already being implemented on Latin American hillsides.

With the technical-scientific knowledge available to solve this problem, the problem is the failure to implement forestry and agroforestry practices on a large scale in the areas mentioned. A careful analysis is therefore required to identify the underlying causes of this situation and put the solutions in the actual context. We shall not attempt to analyze all the likely causes, but rather discuss those that can be said to be common to all parts of Latin America.

For the purposes of our discussion, forestry and agroforestry is taken to mean "the ideal technological practices for the intensification of production on hillsides." By "intensification" we mean "obtaining the maximum return on resources on a sustainable basis", which entails respecting the ecological and ecodynamic constraints to prevent resource degradation.

Understood in these terms, forestry and agroforestry are really practices for reclaiming areas where exploitation and/or utilization has been carried out on a non-sustainable basis, resulting in a process of degradation in the area.

---

<sup>1</sup> Director of the Integrated Natural Resource Management Program, Tropical Agriculture, Research and Training Center (CATIE).

## **FUNCTION OF HILLSIDES**

Hillsides are areas with a slope of over 15% that are easily degraded unless the appropriate production technologies are used. They are different from uplands, where conditions are largely governed by the relative height above sea level rather than the degree of slope. In Latin America's Andean region the combination of these two factors is commonplace, while it is less important in tropical lowland and mountainous areas.

Hillside lands are important because of the role they play in the water cycle and the close relationship that exists between changes in plant cover and the way that the hydrological and hydraulic system of rivers operates during different seasons of the year.

The main effects of drastic changes in land use utilizing inappropriate production systems are:

- ▶ Rapid soil erosion, leading to the loss of productive potential and the sedimentation of river beds and reservoirs, reducing their hydraulic capacity.
- ▶ The loss of the capacity to regulate distribution during the course of the year, reflected in an increase in the size and the frequency of flooding during the rainy season and a marked fall in the water level during the dry season.
- ▶ The deterioration of water quality, resulting in the lack of permanent sources for the different activities required for development.
- ▶ The impoverishment of the local inhabitants and a decline in natural productivity due to the exhaustion of forests and their natural capacity for regeneration.

Thus, it is easy to demonstrate the close interrelationship between hillsides and valleys in a given watershed. For this reason, the management of hillside lands should not be regarded as an expense but an investment to ensure the protection of the water resource and the infrastructure of highly productive areas which normally contribute easily quantifiable capital resources to the national economy.



## MAIN PROBLEMS AND CAUSES OF HILLSIDE DETERIORATION

"Agriculture is of singular importance to Latin American countries. With less than 10% of the world's population, the region contains one fifth of all non-cultivated land, 12% of cultivated land, over 20% of all forests, almost half of all tropical forests and a third of the Earth's fresh water. It also contains around 40% of the world's total biodiversity. However, the number of poor rural inhabitants is approaching 100 million, and for these people agriculture represents the main alternative for employment and income (IICA 1993)."

One of main problems where hillsides are concerned is the demand for land to meet the needs of the burgeoning population and the growth in consumption. The other key issue is the amount of land available at present. Most areas suitable for agricultural production are already being farmed and the areas used to expand frontiers are usually hillsides (Wilken 1991).

Hillsides are regarded as marginal areas for conventional intensive production in view of the limited possibilities for mechanization due the slope and the high initial investment required to protect the soil.

This has led to the development of two hillside production models that are used extensively in Latin America: the large-scale, low-investment model used to fatten beef cattle, and the extractive subsistence model (agriculture and fuelwood).

Due to the large-scale production patterns used on suitable lands in the valleys, the complex land tenure structures in Latin America and the prevailing demographic trends, hillside areas have been incorporated into non-sustainable production with the resulting substitution of pasture and subsistence and shifting cultivation for the natural forest.

One of the main concepts of the production rationale is the intensity of production. For the social group that has traditionally engaged in these activities, the intensity of production means maximizing the returns from forestry and agriculture and minimizing the investment costs. In doing so, they have adopted orthodox economic criteria.

The new, conservation-minded society demands that the criteria for maximizing production be limited by the capacity of the resource used. In other words, that the ecodynamics of the system should not be altered in order to prevent degradation.

One logical conclusion of this line of reasoning is that part of the problem lies in the current production dynamics on Latin America's tropical hillsides and the dilemma facing producers who are asked to choose between agriculture and the short-term benefits it affords, and forestry, where the benefits are reaped in the medium and long-term.

Small farmers in particular are faced with the dilemma of maximizing short-term returns through agriculture and generating longer-term returns through forestry practices. Under this circumstances, they normally opt for maximizing income, though this may well entail the destruction of natural resources (Ashby 1985).

Agriculture is a basic need of the social group which obtains the direct benefits, while forestry is an action required by all the sectors living outside the area (downstream) who are directly affected by the degradation of soils and forests on the hillsides. Thus, poor hillside management becomes a socioeconomic problem *in situ* and a sociopolitical problem *ex situ*.

Much of the reclamation, agroforestry or reforestation work carried out is designed to help farmers living outside the area where it actually takes place. This means that extension agents and the group responsible for the technology transfer are asked to promote soil conservation and reclaim areas that are of no direct benefit to the local population. In other words, their actions do not raise or improve the living standards of hillside farmers; rather, their aim is to reduce erosion and deforestation levels for the benefit of valley farmers (Kaimowitz 1993).

Another complication of some import is the diversity of the farmers responsible for modifying hillsides. Classifying and/or dividing them into groups is a very risky and complicated business. Many types of farmers are found on Latin American hillsides, from landless campesinos to large landholders who make extensive use of the resource. For this reason it is important to pinpoint the key objective of their production patterns. More often than not their aim is to maximize the returns and minimize the investment risk. It is this principle which destroys the ecological foundations of sustainability.

The intensity of production should be determined by the capacity of the resource and not the need of the farmer. The time variable is a major consideration as it limits the minimum income acceptable for the farmer but not the ecological or ecodynamic time-frame required to maintain the integrity of the resource.

To all the above must be added the natural limitations of such areas, with the type and quality of the product playing a key role.

Land tenure and demographic considerations are traditionally blamed for the problems of hillside agriculture. However, since these issues have been widely discussed and are well-known in most Latin American countries, they will not be dealt with in depth in this document.

Hillsides are also being exploited as a result of the structural adjustments that Latin American governments are implementing in their domestic economies. The economies of these countries are based on their natural resources and any policies adopted in other sectors to effect changes in the economy have to be compensated for by exploiting what social groups regard as "common property." This is true of hillside areas in many countries.

## **INSTITUTIONAL APPROACH**

Besides the customary dearth of economic resources and continuity that Latin American institutions are confronted with year after year, there are three key issues which are not usually considered when the topic of hillsides is discussed: 1) the institutional approach; 2) the integration of hillsides and valleys; and, 3) human resources.

The approach of the institutions responsible for the development of production activities causes them to exclude technical assistance to hillside areas for a number of reasons:

- ▶ Their sectoral approach to production is generally based on monocropping.
- ▶ In terms of the potential use of the soil resource, these areas have more forestry than agricultural potential and are the responsibility of another department. On the other hand, as there is no longer any forest cover, they

are not regarded as possible areas for action by this sector either.

- ▶ The structural approach adopted in many cases attacks the symptom rather than the cause (White 1992).
- ▶ A lack of flexibility that prevents executing agencies from tailoring the technical assistance required to conditions of the ground.
- ▶ The absence of policy and legislative mechanisms that would permit and/or promote the integration of production areas, downstream and upstream, transferring social well-being throughout the watershed.

The officials involved have been trained to view matters from a different perspective from the one obtained on Latin American hillsides. Therefore:

- ▶ The natural dilemma of farmers who are faced to choose between agriculture and forestry is not addressed by government agencies.
- ▶ There is a lack of an integrated approach to hillside production systems.
- ▶ The technological expertise of the human resources involved is limited as far as these kind of situations are concerned.
- ▶ Technical assistance and technology transfer are based more on the supply of technology than the demand of the production sector.
- ▶ The lack of institutions flexible enough to realize that the problem is not merely a technical one, but that the socioeconomic variable is a key factor in the transfer process.

## **THE ROLE OF FORESTRY AND AGRICULTURE**

Given the problems that we have described, the solution is to introduce technologies that check degradation and help reestablish the natural conditions in degraded areas, providing for the well-being of the social group responsible for the deterioration.

Forestry is the ideal solution for areas where there are few social pressures or producers have the means to diversify their income, at least temporarily.

In many forested areas where access is not restricted, the harvestable products are of particular importance to the groups with fewest economic options. Activities such as fruit collection and nut picking are not limited as far as the poorest inhabitants of the region are concerned, and the damage done is not great in comparison with the benefits obtained by the families concerned (Arnold).

Agroforestry is one solution where this option does not exist. Agricultural activities are possible using production methodologies that minimize the impact on water and soil resources.

Reclaiming such areas would help reestablish the regulatory capacity of watersheds, reducing flooding and stabilizing water levels during the dry season.

Social and economic factors would be strengthened as the sector would be able to avail itself of the products needed for on-farm consumption and commercialization.

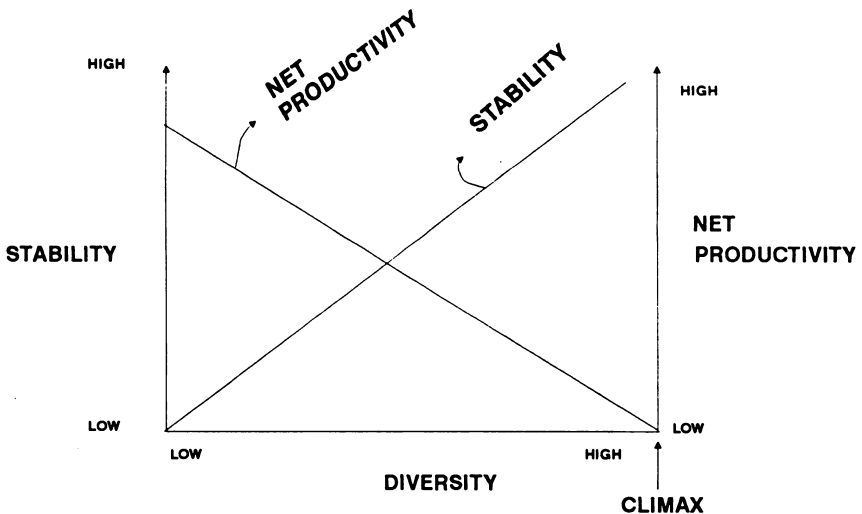
The problem is how to integrate the benefits, as the traditional institutional approach has been to view them as independent and sectoral. Independent, because valley farmers are the ones who energize the national macroeconomy for the domestic and world market (urban demand), while mountain and/or hillside farmers contribute to the local or regional economy (rural demand) and these flows are not picked up or quantified by the national economy. Sectoral, because the items produced do not include the traditional integrated approach of hillside farming.

One issue that must be resolved is the divergence between the production required by hillside dwellers and the maximum ecological use permitted if a process of degradation is to be avoided.

The answer would be to reconcile the two and identify ways of making up the shortfall that would occur if intensive use were pushed to its ecological limits. The importance of correctly implemented forestry and agroforestry activities is their intrinsic capacity for maintaining the environmental balance. Production patterns must be balanced, as shown in Figure 1.

As Figure 1 shows, areas with high diversity and stability have low net productivity. This, of course, in terms of the traditional production system. At present we know that systems high in diversity and stability, as is the case with natural forest, can also generate high net productivity.

The objective of forestry and agroforestry is to strike a balance between the system's stability, diversity and net productivity.



**Fig. 1. The relationship between diversity and stability in natural ecosystems.**

## **EFFORTS CARRIED OUT**

Efforts have been made in a number of Latin American countries to reverse the widespread, rapid destruction of hillsides, but the process continues unabated (White 1992). The legislation enacted to correct the situation has included the reform of the State and of the mechanisms and agencies responsible for providing services to these sectors. In most cases, however, these actions have had little impact.

Hillside forestry and agroforestry activities produce a series of social benefits that are difficult to quantify and that the person making the investment finds it hard even to identify. At the start of the reclamation process, these benefits are more evident outside the production area than within the area itself. Incentives have been offered to encourage reforestation by small, medium and large-scale farmers. The best results have been achieved in areas where a flexible, sound extension system was used to encourage the residents and farmers of a given watershed to cooperate with one another and a consensus was reached on the need to protect a common asset (White 1992).

When a resource grows scarce, people's attitude toward its conservation begins to change. The success of many reforestation projects is due to the disappearance of the resource on which some primary activity is based, the most common example being fuelwood.

Fiscal incentives are successful in the case of large companies, but small farmers are excluded. Direct economic incentives have been produced more benefits and better results where small farmers are concerned.

## **CONCLUSIONS**

Despite all the efforts made in the legislative field and the use of incentives programs, the degradation of hillsides has not been checked. Enough is known about technologies that could mitigate the effects of this deterioration, but they have not been incorporated into the production patterns of the areas concerned. Only when the variables that most strongly influence farmers' acceptance of new production patterns and foster a change of attitude towards the forest have been clearly identified, will it be possible to formulate effective policies to check the degradation of hillsides.

**REFERENCES**

- Ashby, J.A. 1985. The Social Ecology of Soil Erosion in a Colombian Farming System.
- Arnold, J.E.M. undated. Policy Uses Related to the Role of Trees in Rural Income and Welfare Security.
- Colby, M.E. 1989. The Evolution of Paradigms of Environmental Management in Development.
- IICA. 1993. Agricultura Sostenible en Iberoamérica: Acciones para los Desafíos del Futuro Inmediato.
- Kaimowitz, D. 1999. La Experiencia en Centroamérica y la República Dominicana con Proyectos de Inversión que buscan Sostenibilidad en Laderas.
- Rodrigo, P. 1988. Bases Ecológicas de Desarrollo Integral de Cuencas.
- USAID. 1989. Manejo de los Recursos Naturales y del Medio Ambiente en Centroamérica: Una Estrategia para la AID.
- White, T.A. 1992. Landholder Cooperation for Sustainable Upland Watershed Management: A Theoretical Review of the Problems and Prospects.
- Wilken, L.C. 1991. Sustainable Agriculture is the Solution but; What is the Problem?



## **INTERSECTORAL AND INTERREGIONAL POLICIES AND THEIR IMPACT ON FORESTRY POLICY**

Marielos Alfaro<sup>1</sup>

### **FOREST RESOURCES IN LATIN AMERICA**

Man continues to log Latin America's forests at an alarming rate to keep forestry industries going and open up land for other uses. The absence of a clear land use planning policy based on the land's productive capacity and existing needs has led to the expansion of agricultural frontier in the countries concerned.

The FAO reported that in 1980 the western hemisphere's tropical rain forests accounted for 45.9% (889.8 million hectares) of the world's total rain forests, and 24.5% of all forests. FAO also estimated that 5.7 million hectares of forest lands were logged in the tropical regions of the Americas in 1980, or 50% of all deforestation in the tropics. According to the FAO, by the late 1970s the causes of deforestation around the world varied from region to region. However, the single most important reason was the conversion of the forest to agricultural uses. In Latin America, other causes have included stock raising and land settlement programmes (United Nations 1991b).

The FAO's provisional estimates for the decade 1981-1990 show that the rate of deforestation of tropical forest ran as high as 16.8 million hectares per year. Assuming that the ratio remained the same as in 1980, it would mean that 8.4 million hectares of land per year was deforested in Latin America's humid tropics over the course of the decade (United Nations 1991b) - an increase of 2.7 million hectares per year.

Unsustainable forest utilization has been another reason for the deterioration in the region's forests. They have been subjected to continuous logging, with no management of any kind, extracting trees at a faster rate than the growth of the forest. Indiscriminate logging and the overexploitation of forests has reduced their productive potential, threatening both animal and plant species with extinction.

This utilization reflects not only the forestry industry's demand for raw materials and the change in soil use, but also the demand for

---

<sup>1</sup> Consultant, Earth Council, Costa Rica.

products in other areas of the economy, such as the construction and energy sectors.

## INTERSECTORAL ISSUES

### Agricultural Sector

The development policies most commonly implemented in the agricultural sector in Latin America have stimulated the expansion of the agricultural frontier and, as a result, contributed to the degradation and elimination of forest.

The following are some of the economic policies and measures implemented in the region that have affected the forestry sector.

#### *a. Subsidies for Cattle Ranching*

Between 1984 and 1986, the ratio between heads of cattle and human beings in Latin America's tropical regions stood at 1.42, while the world average was 0.82 (United Nations 1991b).

In Central America between 1955 and 1975, the total surface area devoted to cattle ranching rose from 3.9 million hectares to 9.4 million hectares. Stock raising activities came to occupy one fifth of the land in the region (Nations and Komer 1987).

In Costa Rica, between 1950 and 1984 the land used for agricultural production rose from 16.3% to 44.4% of the national territory, while forest lands declined from 47.0% to 26.0% (MIRENEM 1990).

The change in soil use from forest to pastureland in Brazil is another example of the impact of cattle ranching subsidies. From 1970 onward, the large number of fiscal subsidies introduced to provide tax breaks for cattle ranching, allied to credit at highly subsidized interest rates, impacted the Amazon rain forests. It is calculated that around 75% of all cattle ranching investment in the Amazon region was financed through subsidies of this kind. This resulted in the deforestation of three million hectares of land between 1970 and 1980 (IICA 1991).

Besides contributing to deforestation, cattle ranching has been a factor in higher unemployment and the migration of the rural population (rural-rural and rural-urban migration), as a low level of manpower is required per unit of surface area.

Agricultural subsidies should be restructured so that they no longer contribute to the deforestation process. Furthermore, incentives should be introduced to encourage reforestation and natural forest management. This would make it possible to recover forest cover in logged-over areas and prevent the degradation of forest caused by traditional logging activities.

*b. Land Settlement Policies*

In many Latin American countries legislation has made it clear to farmers that the way to obtain legal ownership of their land is by "improving" the property. Unfortunately, as far as forest resources are concerned these "improvements" have tended to mean logging the forest and using the land for agricultural purposes. Other benefits enjoyed by farmers once they have effected these "improvements" include access to credit and higher property values. If the farm is expropriated, its value is calculated based on the improvements that have been carried out. Measures of this kind reward farmers for cutting down the forest.

The above policy was based on the need to make new land available for agricultural production and thus contribute to national development. However, such measures were justified only so long as land with agricultural potential remained covered with forest and more land was needed for agricultural production.

By the 1970s most of the land suitable for agriculture in Latin America was already being used for such purposes and the remaining areas of forest stood on land with forestry potential. Since that time, this land settlement policy has led to the conversion of forest land to other uses in areas where the prevailing conditions clearly indicate that the land is best suited to forestry activities.

The expansion of the agricultural frontier at the expense of the forest was a quick-fix solution adopted by successive governments to ease the pressures created by an increasingly impoverished rural population that was finding it ever more difficult to gain access to the means of production, and to avoid having to tackle the real causes of rural poverty.

When poverty is exacerbated by inadequate training, the lack of access to credit, the inability to offer the labor force different employment opportunities, subsistence agriculture and migration, it undermines development and accelerates the deforestation process. For the 17 million poor people who live in rural Central America, logging the forest to use the land for agricultural purposes is often the only alternative they have if they are to survive (Pedroni and Flores 1992).

In Guatemala a tiny minority of landholders (2%) own large extensions of land which is used to grow agroexport crops. This forces campesinos who do not have access to low-lying, fertile land in the valleys to cultivate marginal land that is unsuitable for agriculture. The situation is made worse by the fact that half of the land owned by the minority is not even used. As a result, between 1960 and 1991 the proportion of the total surface area covered by forests fell from 77% to 50%. Some 90% of all deforested lands were settled for agricultural purposes (WRI, IUCN, UNEP 1992).

*c. Incentives for Agroexport Crops*

In Central America between 1950 and 1970, the land used to grow agroexport crops rose from 800,000 ha. to 1.7 million ha. The development of the coffee and banana trade, for example, called for the construction of roads and railways, opening up forested areas that were quickly converted to other uses (Utting 1991).

Today the agricultural frontier continues to expand at the expense of the remaining forest. Examples of this are the growth of banana plantations in Costa Rica, the logging of forest in order to plant citric fruit trees and banana trees in Belize, and the credit being provided for agricultural development in the Peten region of Guatemala and in the provinces of Colon and Yoro in Honduras. In Guatemala,

agricultural sector credit quadrupled between 1981 and 1991. This shows that at both the grassroots and political decision-making levels, forests continue to be regarded as a land reserves that can be converted to other uses to meet the demands of a burgeoning population (Martinez and Camino 1990).

*d. Land Use Development and Tenure Policies*

Some 35% of Latin America's population live in rural areas and a similar percentage work in the agricultural sector. Roughly 102 million inhabitants of these areas are poor and many use production techniques that damage the environment (World Bank 1990). However, although they make up the majority of the population, they own the smallest percentage of land.

As we have already noted, the concentration of land in few hands is another obstacle to rural development in Latin America. Agroexport companies, usually transnationals, own an increasingly large slice of the rural areas of Latin America. The same applies to stock raising, which requires large areas of land.

These policies are normally supported by the government of the day and institutionalize the concentration of land in few hands and exclude and/or adversely affect the rural population.

*e. Credit Policies*

Under the credit policies operated by national financial entities, in order to be eligible for credit farmers must demonstrate their ability to pay and provide a series of trust and/or mortgage guarantees. These conditions can only be met by medium and large-scale landowners, so they are the beneficiaries. In the case of Costa Rica, where 40% of the national territory is used for cattle ranching, large landowners used to pay small migrant farmers to convert forest to pastureland. The development of stock raising was supported by international agencies such as the World Bank and the IDB through their credit policy (Utting 1991).

These policies and measures have, in some cases, placed excessive pressure on forest resources. Some analysts have described

the incentives offered to the agricultural sector as "perverse" or "distorted" by the adverse effects that have on the environment and the poorest sectors of society (United Nations 1991a).

### **Energy Sector**

The FAO estimates that by the year 2000 world consumption of fuelwood will have reached 2,053 million m<sup>3</sup> a year, with developing economies accounting for 75.4% of the total. Central America, the Caribbean and South America will consume 302 million m<sup>3</sup> a year, or 14.7% of the estimated total for that year.

It is estimated that the annual world shortfall will rise to 960 m<sup>3</sup> by the year 2000. It is also calculated that 240 million tons of oil, or an investment of US\$ 45 million, would be needed to make up that shortfall each year (United Nations 1991b).

Fuelwood and charcoal supply a large proportion of the energy needs of many countries. In Central America, fuelwood accounts for around 50% of total energy consumption and 72% of consumption in rural areas. The pressure exerted on the forest by communities in need of supplies of fuelwood is greater in the dry areas of Latin America (CCAD 1991).

In Brazil the demand for fuelwood and charcoal is the main cause of deforestation in logged-over forest (United Nations 1991b).

In Costa Rica (Reiche and Campos 1986) the main industrial use for fuelwood is for drying coffee grains at coffee processing plants. Annual consumption in 1982 was 200,000 m<sup>3</sup>. Some 15.5 million liters of diesel oil would be needed to replace fuelwood, or an investment of US\$ 5.6 million at 1982 prices. The annual cost of fuelwood for the industry, on the other hand, was put at US\$ 0.87 million.

The constant increases in the cost of fossil fuels has led consumers to look around for alternative energy sources. Clearly fuelwood is cheap and, even more importantly, is a renewable resource, while the prices of fossil fuels rise constantly and their use has other harmful effects.

## **The Construction Sector**

In the Americas, wood is the most popular material for constructing houses and buildings. In Latin American countries, Brazil and Chile excepted, over 90% of the industrial logs produced are sold on the domestic market (Bourke 1991).

Population growth is fuelling demand for these products and so far the availability of substitutes has failed to reduce timber consumption.

Government-sponsored, low-cost housing programmes call for large quantities of lumber. In Costa Rica, 89.6% of commercially-sold logs are bought by sawmills and used to produce lumber for building and furniture-making.

## **GREEN ACCOUNTING**

In the 1970s certain European countries began to develop a system of environmental or "green" accounting incorporating the economic value and the depreciation of natural resources into national economic accounting.

Green accounting evaluates the growth and depreciation of environmental resources and helps to identify long-term policies aimed at sustained growth. The main method used to incorporate green accounts are "satellite accounts", the aim of which is to contribute to the development of an effective environment policy (Hoehn 1993).

The countries that presently operate a system of this kind are Germany, Canada, the United States, France, Japan, Norway and Sweden. Recent studies carried out in Latin America include those undertaken in Costa Rica (CCT 1991) and Mexico. Further studies are now underway in Brazil, Colombia, Peru and Uruguay ((Hoehn 1993).

In Costa Rica (CCT 1991), the study focused specifically on the forestry sector, the fisheries sector in the Gulf of Nicoya, soils and coastal resources. In the forestry sector it was found that forests are being destroyed at a very rapid rate and that the worst destruction has occurred in the life zones where the greatest biodiversity is to be found. For example, in 1984 the value of the forest lost was put at US\$ 159 million, or the equivalent of US\$ 65 per inhabitant. Between

1988 and 1989 the depreciation of the forest resource was 36% more than the cost of servicing the external public debt.

Soil loss, evaluated in terms of erosion and nutrient loss, represented between 6.5% and 13.3% of agricultural GDP. It is estimated that over 2,200 million tons of soil were lost between 1970 and 1989. Around 61% of this loss occurred on land used for annual crops, 33.8% on pastureland, and 5.1% on land given over to perennial crops.

The CCT decided to analyze the fisheries sector from the regional or sectoral standpoint and the results suggested that it did not constitute a substantial component of national accounts. From an analysis of this activity in the Gulf of Nicoya it became clear that growth in the gross fisheries product during the 1980s was achieved only at the cost of long-term productivity. Coastal resources were evaluated and the conclusion was that the sustainable management of mangrove swamps could make an important contribution to the regional economy.

In general these economic analyses indicated that natural resources are being used up faster than nature can replace them and are therefore depreciating rapidly. The value of the aggregate depreciation of forest, soil and fishery resources between 1970 and 1989 was put at 174,712 million colones at constant 1984 prices (roughly US\$ 3,700 million). Taking the agricultural sector and natural resources together, we find that the depreciation in the latter means that the value of agricultural production was actually 29% less per year during the period studied.

The study makes it clear that the nation's economic development has been achieved only at the cost of the non-sustainable use of its forest-soil-fishery resources and that the country's natural wealth has declined as a result. A similar process has occurred in most, if not all, Latin American countries.

If efforts of this kind are to have an impact at the environmental level, the nations of the world must agree to make green accounting part of the System of National Accounts.

The Global Biodiversity Strategy (WRI, IUCN, UNEP 1992) states that green accounting should reflect the economic losses incurred as a result of the deterioration of biological resources and the



loss of biodiversity. It also suggests that to underpin the efforts of the countries, the United Nations should review the System of National Accounts (SNA) to include the value of biological resources. However, it also states that conservation decisions should never be taken strictly on the basis of a cost-benefit analysis.

## INTERREGIONAL ISSUES

### 1. International Trade in Tropical Timber

The total value of exports of timber and wood products in 1989 was US\$ 94.7 million. Some 86% of this trade was between developed nations.

The international tropical timber market is controlled by countries in the North, which are the biggest importers. Exporter countries mainly market unprocessed or semi-processed products (logs, sawn wood and plywood).

Tropical logs account for 16.0% of world timber production used for sawing and veneer wood, and only 17% of this is exported, generating a total of US\$ 2.4 billion, or 2.5% of total world exports. The main importers are Japan and the US, and the biggest exporters, Malaysia (Sarawak and Sabah) and Indonesia.

In most Latin American countries timber exports account for barely 10% of annual production (Bourke 1991). Brazil and Chile are the region's leading exporters. The first exports plywood, particle board, wood chips or wood for pulp, paper, and cardboard, while the second mainly exports pulpwood.

Although these countries recognize the need to process more of their products, the consumer countries have no wish to see a change of this kind.

Consumer countries normally impose barriers to the import of more processed products. The measures they adopt to achieve this include high tariffs, quotas and high quality standards for products of this kind (Hamilton 1991). These trade patterns for forest products put pressure on the prices of Third World exports, which in turn discourages forest management.

Over the last decade, competition in the timber trade has intensified among countries in the North and this has had a further adverse effect on tropical timber producers (United Nations 1991b).

Another of the mechanisms used to restrict and control the trade in tropical timber are the boycotts that have been promoted by the consumer countries since 1987 when the Friends of the Earth in the UK called for a boycott. In 1988 further measures were adopted by West Germany, the European Parliament, Australia, the Low Countries, Japan and the US. The declared purpose of such measures is to reduce the logging of tropical forests and encourage their conservation (Hamilton 1991).

In January 1991 San Francisco was the site of the first meeting to promote the Smart Wood Certification Program, the aim of which is to certify timber extracted from managed forest, giving producers a "Green Seal" to facilitate international trade in timber of this kind. In March 1992 the Forest Stewardship Council was created in Washington for the purpose of promoting environmentally sound, socially advantageous and economically viable forest management (Elliot 1992).

This mechanism replaces the previous practice of boycotting timber extracted from tropical forests. The seal will be awarded by the Rainforest Alliance and the decision is based on market surveys carried out in a number of European countries which suggested that consumers are willing to pay a higher price for timber extracted from managed forest. Higher prices could provide an incentive for tropical forest management, provided that the producer benefits directly.

There is a need to create and strengthen local and world markets for non-timber forest products. Forest production must be diversified and markets for non-timber forest products identified. Advantage should be taken of the existing market for timber products to create opportunities for marketing less well-known products (WRI, IUCN, UNEP 1992).

### **Protection of the Atmosphere: Climatic Changes**

The Scientific/Technical Declaration of the II World Climate Conference in 1990 noted that emissions resulting from human activity are increasing concentrations of greenhouse gases in the atmosphere.

There was also agreement on the diversity of climatic changes that could be expected (United Nations 1991).

The Declaration states that forest cover can help check changes in the world's climate. Due to the fact that 24.5% of the world's forests lie in the tropics, financial resources should be channeled towards developing countries to enable them to manage their forests.

The protection and management of forest ecosystems should be coordinated and made compatible with other measures aimed at reducing greenhouse gas emissions, the rational use of biological resources, the supply of financial resources and the need for more favorable market conditions for forest products (United Nations 1991).

It is essential to check the rates of deforestation and increase forest cover by establishing forest plantations. Inter-sectoral linkages should be used to address the problem of climatic change, in particular those between agriculture, forests, biodiversity and oceans.

### **Conservation of Biological Diversity**

The chapter on the Conservation of Biological Diversity in Agenda 21 (United Nations 1992) underscores the importance of the sustainable use of biological resources and support for the Biodiversity Convention. To do this we must protect forests, savanna, prairies, pastureland, deserts, tundra, rivers, lakes and seas, as these contain most of the Earth's diversity.

There are an estimated 10 million species worldwide and 50%-90% of them are to be found in tropical forests. At the present rate of deforestation, 5%-10% of tropical forest species could disappear over the next thirty years (WRI, IUCN, UNEP, 1992). In addition, 60% of all medicines marketed around the world are extracted from plants growing in these ecosystems. The economic benefits have not filtered down to the owners of the forests, however.

Given the interregional nature of biodiversity, Agenda 21 (United Nations 1992) states that in coordination with international bodies, NGOs and communities, governments should promote incentives to foster the conservation of biological diversity, the sustainable use of biological resources and the promotion of sustainable productions systems, including forestry and agroforestry.

To protect biodiversity, governments should abandon forestry policies that encourage the degradation of resources and the conversion of forest ecosystems to other, less valuable uses. They should also promote sustainable natural forest management and afforestation and reforestation (WRI, IUCN, UNEP, 1992).

Clear cutting should be outlawed and financial support provided to the owners of forests to promote conservation by means of sustainable management. In privately-owned, densely forested areas with special characteristics where complete protection is deemed advisable, the owners should be encouraged to leave the ecosystem untouched.

In Latin America training programmes for natural resources experts should be strengthened, and funding provided for basic and applied research to meet the need for information in this field.

There should be close cooperation between the participants at international fora on climate change, the conservation of biodiversity and, therefore, the conservation of forest. The decisions taken by the international community should reflect a policy aimed at integrating all natural resources as the only means of restoring the health of the planet.

## **DECLARATION OF FOREST PRINCIPLES**

### **Declaration of the Governments**

In its Agenda 21, the United Nations' Conference on Environment and Development held in Brazil in 1992 clearly established the link between the loss and degradation of forest resources and development policies in other sectors of the economy, poverty, unsustainable consumption patterns, demographic growth and human health (United Nations 1992).

At the world level it was hoped that the Earth Summit would lead to the adoption of the Forest Treaty. However, the end product was less ambitious. The governments adopted a Declaration of Principles on the management, conservation and sustainable development of forests of all kinds, but the Declaration is not legally binding.

The signing of a Treaty to protect and manage the world's forests was one of the goals of several countries involved in the ECO 92 process. However, the terms of the treaty were not clearly established and it was a casualty of the North-South confrontation. Nor was agreement reached on a strategy for drafting a new convention in the near future (Elliot 1992).

The Declaration of Principles is clear as to the importance of these ecosystems in maintaining local, national, regional and global processes and the ecological balance. Throughout the document the signatories stress that the purpose of sustainable management is to meet the social, economic, ecological, cultural and spiritual needs of present and future generations. Despite this clear thinking on the importance of forests to the world as whole, however, countries were unwilling to commit themselves to adopting domestic forest management and conservation measures. The Declaration states that the international community should do everything in its power to promote an economic environment conducive to forest management and conservation. In addition, it calls for international financial and technical cooperation on reforestation and the reclamation of unproductive land.

However, the financial resources required for the programmes to combat deforestation amount to US\$ 31,250 million, of which only US\$ 5,670 million (18.1%) were forthcoming from the international community in the form of donations or on concessionary terms (United Nations 1992).

The conservation and sustainable development of forests calls for additional capital investment to permit the introduction of the forestry and industrial technology best suited to the particular conditions of each area, region or country. Tropical countries do not possess the financial resources to meet the costs of such programmes. The consumers of tropical timber and the international community as a whole should shoulder the costs of forest conservation. Only then will the world's forests continue to provide goods and services, including vitally important services to the environment.

### **Declaration of the NGOs**

The Declaration of the NGOs sets out a clear, firm position regarding the need to protect the forest and presents three options for

their conservation: full protection, sustainable management and the recuperation of degraded forest.

A key strategy should be the promotion of public education and consultations at the grassroots level on decisions regarding the use of the forest. The intention is that local inhabitants monitor the forest resource and other related resources. This is even more important when indigenous communities living in the forest or in adjacent areas are involved.

The NGOs are totally opposed to the conversion of the forest to any other productive activity whatsoever. Moreover, they insist that the world's reforestation efforts should be geared toward the use of a mix of native species in order to avoid the plant health problems connected with monocultural systems and restore degraded areas through natural regeneration. This calls for further research into the production systems of native species and the management of natural regeneration.

The proposals put forward by the NGOs are very specific, and address forestry, socioeconomic, technological and political issues. Since the conference these organizations have assumed the task of monitoring forest resource management worldwide.

Part of the work of the forestry services and NGOs involved in sustainable forest management will be to ensure that the benefits of the forest are reaped by the local inhabitants and owners. If consumers are willing to pay extra for timber extracted from managed forest (the "green seal" system), these organizations should ensure that the money generated is paid to producers rather than to other participants in the timber-marketing chain.

## **FOREST MANAGEMENT**

One of the strategies for conserving tropical forest is sustainable management. Such management should be geared not only toward the timber resource, but all the other goods and services that the forest provides. Given the importance of these ecosystems, biodiversity conservation practices should be included in forest management.

Many States have failed to assign the forest issue the importance it deserves, as reflected in the low level of investment in

this activity. Forest management calls for a sizable investment in two areas. Firstly, sufficient financial resources must be provided to permit the use of improved logging and forestry techniques and, secondly, there should be investment in the training of professionals and the education of the local population.

At the international level, the programmes mentioned in the chapter of Agenda 21 (United Nations 1992) entitled "Combating Deforestation" are geared toward the conservation of the world's forest resources through the total protection of fragile ecosystems and the sustainable management of productive forest areas.

The document proposes strengthening the national institutions responsible for the forests and effectively ensuring the sustainable utilization and management of all types of forest and related resources and all forest lands. Forest management will not only increase the production of goods and services but generate other benefits such as jobs and income in rural areas, higher prices for forest products through processing and commercialization, a bigger contribution by the sector to the national economy and a higher return on investments.

To demonstrate some of the problems of tropical forest management, let us turn to the case of Costa Rica. Steward (1992) developed a model of Costa Rica which revealed that sustainable forest management would not permit a 4.6-member campesino family to generate the minimum income required. Furthermore, in order to earn such a minimum income the family would have to own roughly 90 ha. of forest. According to the 1984 agricultural census, 87.1% of the country's farms are less than 50 ha. in size, making this a limiting factor.

This study looked at the sale of timber on the local market. The price paid for logs is very low in comparison with the price of the finished product sold to the final consumer. As a result, the owner of the forest receives very little in the way of income, while the lion's share of the profits goes to the processors and middlemen.

When sustainable forest management was compared with the option of completely liquidating the resource by means of clear cutting, the latter was shown to be three times more profitable (Steward 1992). Therefore, the owners of land find it more attractive to use their property for agricultural or stock raising activities. This situation has led the Costa Rican Government to offer economic incentives to

landholders who implement sustainable management practices in their forest. Incentives of this kind make it possible to implement harvesting and forestry techniques consistent with the site and the forest stand without reducing the forest owner's income from the sale of timber. These measures are necessary but are only temporary, to correct the market distortions that are affecting forestry activities.

### THE CASE OF QUINTANA ROO (MEXICO)

A community forest management project involving the inhabitants of ten *ejidos* has been underway since 1983 in the Quintana Roo region of Mexico. For the purposes of the project, the organizers set up the Quintana Roo Society of Ejido Forestry Producers (National Institute for Adult Education 1992).

Forests in the region were heavily logged during the 1950s when the Mexican Government granted use rights over 550,000 hectares of forest to a timber company for a 25-year period. The area in question included nine *ejidos*, whose members were denied access to the resources.

Now, with the support of government experts, the Society has established guidelines for managing the forest. Annual timber production was fixed at 3,850 m<sup>3</sup>, 22% of which is made up of precious woods and the remainder of other less well-known tropical hardwood species. The diameter limit was fixed at 55 cm of DBH and the trees are marked by the project's technical staff. The area has been divided into 25 annual logging units giving a rotation cycle of 25 years.

There are two sawmills to process the Society's timber, while mobile sawmills are used by the *ejidos* with smaller forests. Cabinet-making workshops have been set up on some *ejidos* to take advantage of the wood obtained from less well-known species. A furniture-making business has also been organized to process choice tropical woods such as mahogany and cedar and thereby achieve a higher aggregate value for their products. These industries create jobs for *ejido* members.

Producers engage in reforestation with valuable species, producing seedlings either at the Society's nursery or with each member of the *ejido* producing a specific amount of plant material. They have also managed to recover 20,000 ha. of secondary forest by



protecting degraded areas. *Ejido* members protect wildlife and have made ecological tourism part of their activities.

The objectives of the Society are to conserve the forest, diversify exports of its resources, restore degraded areas and manage projects at the community level.

Parallel to the forest management project, the *ejidos* have managed to step up their agricultural production through the use of soil conservation practices such as the construction of terraces on hillsides, the application of organic fertilizer and the use of pasture and legumes as living fences.

The residents of Quintana Roo have learned to value the forest through the direct benefits they have obtained from it, mainly timber. Allowing the population access to the forest resource has enabled them to boost their income and created awareness of the importance of forest management. The State has thus managed to restructure the use of forest resources to the benefit of the rural communities themselves.

The policy that has contributed most to the success of the project has been the handing over of the forest to the local residents, the provision of technical assistance, and training in forestry and industrial activities that create jobs in the communities.

## REFORESTATION PROGRAMS

By 1980 tropical countries had reforested 11.5 million ha. of land. The annual rate of reforestation between 1981 and 1985 was put at 1.1 million ha. Based on these figures, it is projected that by 1990 there were 25 million ha. of forest plantations in tropical countries (United Nations 1991b). Evans (1986) reported that in 1985, 27.8% of all forest plantations were to be found in South America, Central America and the Caribbean. Clearly, the annual rate of deforestation in Latin America is much higher than the annual rate of reforestation.

In order to promote reforestation programs in Latin America, governments have opted for incentives to encourage farmers to establish and manage forest plantations.

Central America already has around 30 million hectares of land with forestry potential that is not covered with forest at present. In order to incorporate these lands into forestry production, Central American governments have established various kinds of incentives for reforestation and natural forest management. These fall into two broad categories: socially-oriented incentives targeted at small farmers, and incentives for commercial producers (Reyes 1992).

Agenda 21 (United Nations 1992) underscores the urgent need to adopt coherent measures to conserve and increase forest resources. This calls for countries to implement intensive tree planting programmes to restore degraded land, prevent the problems caused by erosion and combat desertification in some regions. Furthermore, existing forestry plantations will have to be improved, regardless of whether they are intended for industrial and commercial production or protection.

## CONCLUSION

The development of the forestry sector is affected by sectoral policies and policies in other areas of the economy that have a direct or indirect impact. Sound forestry and agroforestry policy takes account of the relationship between natural resource management and agricultural, energy and construction sector policies, poverty, the need for jobs and the needs of the communities living inside or near the forest. These intersectoral relationships must be acknowledged and analyzed to find effective solutions to the problems facing the forestry sector.

Table 1 sets out the kinds of policies and mechanisms that should be implemented to reduce or offset the negative impact of policies in other sectors and restructure the use of forest resources by granting the local population access to them.

The priorities include a reassessment of policies in the agricultural, energy and construction sectors, particularly in regard to credit and incentives in general.

The countries should strengthen their monitoring and control mechanisms to ensure the rational utilization of agricultural, livestock and forestry activities and make environmental impact assessments (EIA) a part of all development projects. A soil conservation and restoration strategy should be a priority, recognizing the key importance of this resource for humanity.

**REFERENCES**

- BOURKE, I.J.** 1991. El mercado de la madera: su importancia para los países en desarrollo. *Unasyuva* 167, Vol. 42.
- CENTRO CIENTIFICO TROPICAL (CCT).** 1991. La Depreciación de los Recursos Naturales en Costa Rica y su Relación con el Sistema de Cuentas Nacionales. Centro Científico Tropical, San José, Costa Rica.
- \_\_\_\_\_. 1991. Plan de Acción Forestal Tropical para Centroamérica. Base Document. San José, Costa Rica.
- ELLIOT, CH.** 1992. Política Forestal Internacional: ¿Qué camino tomar? *Boletín SAVIA (Ecuador)* No. 10 (September): 2-3.
- EVAN, J.** 1986. *Plantation Forestry in the Tropics*. Oxford University Press, New York.
- FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO).** 1988. *Productos Forestales: Proyecciones de las perspectivas mundiales 1987-2000*. Estudio FAO Montes No. 84. Rome.
- HAMILTON, L.S.** 1991. Bosques tropicales: mitos y realidades. *Unasyuva* 166, Vol. 42: 19-27.
- HOEHN, J.P.** 1993. Sistema uruguayo de contabilidad ambiental: Alcance del trabajo y prioridades iniciales del proyecto. In *Seminario sobre Cuentas Ambientales y de Recursos Naturales para Políticas de Desarrollo*. Organization of American States, Wasington, D.C.
- INSTITUTO NACIONAL PARA LA EDUCACION DE ADULTOS.** 1992. *Manejo de Selvas*. Video produced by the Red de Comunicación Educativa de México. Mexico D.F.
- INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE (IICA).** 1991. *Toward a working agenda for sustainable agricultural development*. San Jose, Costa Rica.

- MARTINEZ FERRATE, R. 1992. Agricultura, Vida y futuro de un Continente. Paper presented at the Día del Egresado IICA-CATIE. Turrialba, Costa Rica.
- MARTINEZ, H.; DE CAMINO, R. 1990. El manejo de bosques húmedos tropicales en América Central. FAO, CATIE, Turrialba, Costa Rica.
- MINISTERIO DE RECURSOS NATURALES, ENERGIA Y MINAS. 1990. Plan de Acción Forestal para Costa Rica, Base Document. MIRENEM, San José, Costa Rica.
- NATIONS, J.; KOMER, D. 1987. Rainforests and the hamburger society. *The Ecologist*, Vol. 17, No. 4-5.
- PEDRONI, L.; FLORES, J. 1992. Diagnóstico Forestal Regional para Centroamérica y propuestas de trabajo. Report of the IC and IUCN/ORCA for the Swiss Development Corporation (SDC). San Jose, Costa Rica.
- REYES C., RICARDO. 1992. Incentivos Forestales en Centroamérica. Working document prepared for the Conferencia Centroamericana de Incentivos Forestales.
- UNITED NATIONS. 1991. General Assembly. Protection of the Atmosphere: Climatic changes. Report of the Secretary General of the Conference. Preparatory Committee of the United Nations Conference on Environment and Development. A/CONF.151/PC22.
- GENERAL ASSEMBLY. 1991A. CROSS-SECTORIAL ISSUES: The relationship between demographic trends, economic growth, unsustainable consumption patterns and environmental degradation. Report of the Secretary-General of the Conference. Preparatory Committee for the United Nations Conference on Environment and Development. Third session. A/CONF.151/PC/46.
- . 1991b. Conservation and Development of Forest. Report by the Secretary-General of the Conference. Preparatory Committee for the United Nations Conference on Environment and Development. Third Session. A/CONF.151/PC/64.

**United Nations. 1992. United Nations' Conference on Environment and Development. Agenda 21. A/CONF.151/26.**

**UTTING, P. 1991. The social origin and impact of deforestation in Central America. United Nations Research Institute for Social Development. Discussion paper 24.**

**WORLD BANK. 1990. World development report. Washington, D.C.**

**WRI, IUCN, UNEP (World Resources Institute, the World Conservation Union, United Nations Environment Programme) 1992. Global Strategy for Biodiversity. Guidelines to save, study and use the earth's biotic wealth on a sustainable and equitable basis. WRI, IUCN, UNEP.**

## THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT AND INTERNATIONAL FORESTRY POLICIES

Alicia Bárcena<sup>1</sup>

The United Nations Conference on Environment and Development held in Rio de Janeiro in June 1992 actually focused more on development than on the environment. It provided an opportunity to discuss the international system and its four mainstays: the Breton Woods institutions, the United Nations Organization system and its specialized agencies, transnational corporations, and the International Court of Justice.

One session was given over at the Conference to a discussion of the role of the Breton Woods institutions (including the World Bank and the International Monetary Fund). They were said to have been instrumental in promoting unsustainable development and the resultant deterioration of natural resources through their policies and the management of their investment portfolio.

Whatever role they may have played in the past, these international entities have emerged stronger than ever as they now implement environmentally-oriented activities. The World Bank, for example, now manages the Global Environment Facility (GEF) created to deal with four key issues: the ozone layer, policies on climate change, biodiversity and international waters.

For its part, the International Monetary Fund is presently examining ways of incorporating into structural adjustment policies the proposals set out in Agenda 21 and other documents on the environment and development. As a result of the discussions, these institutions decided that they should change their policies. One change in the structure of the World Bank has been the creation of the Vice-Presidency for Sustainable Development. The real significance of these changes is open to question, however.

The main issue regarding transnational corporations was whether they would allow themselves to be audited. These corporations largely control natural resource policies at present. Government policies may be discussed in international fora, but it is debatable whether Latin American and Caribbean governments are

---

<sup>1</sup>

Executive Director, Earth Council, San José, Costa Rica.

really in a position to design their own policies, and to what degree they are influenced by the Breton Woods institutions, transnational corporations and international markets.

During the Conference both the Breton Woods institutions and the transnational corporations were "silent" players. Although they did not have a seat at the negotiating table, their presence was felt in the discussions because they have played such a key role in the development and management of the world's natural resources.

One missed opportunity was the failure to reach agreement on the funding issue. Two important aspects of the problem were identified in Conference Resolution 44/228. The first concerned the provision of new, additional development aid resources by the developed nations to meet the costs of the transition toward sustainable development. That is, actually providing fresh resources during the transition phase rather than restructuring the present aid package. No agreement was reached on this issue during the Conference, however. The second point was the need to factor the transfer of technology on non-commercial terms into the environmental equation. The Conference failed to resolve either of these two key issues.

Some important results were achieved, however, including the Rio Declaration setting out the political commitment of the 120 Heads of State in attendance. Another breakthrough was Agenda 21, one of the most comprehensive international programmes ever negotiated and virtually a blueprint for sustainable development. A further significant achievement was the signing of the Biodiversity Convention, an issue closely linked to the forestry question. The convention was signed by 157 of the 170 nations in attendance and has since been ratified by about 20 countries. It must be ratified by around 35 countries before it takes effect, however.

The Convention on Climate Change was the fourth major achievement and was also signed by roughly 156 countries. This convention should be the touchstone for analyzing forestry issues in view of the very obvious link that exists between the world's forest stand and carbon dioxide sinks.

Lastly, we come to the "Non-legally Binding Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forest." It had been

hoped that the meeting would result in the signing of a World Forest Convention, but the participants failed to reach agreement on this issue. Several years' work had gone into drafting this treaty and the failure to sign it was due to the lack of consensus between tropical and temperate-zone countries, a point that will be discussed below.

## **AGENDA 21**

Agenda 21 is a major international programme that was negotiated and agreed upon by 170 countries and 120 Heads of State. It reflects the commitment of the politicians present. Now the agreements must be implemented. Agenda 21 is divided into four sections, 40 chapters and 15 programmes containing 2500 specific decisions that will require advisory assistance, evaluations and careful monitoring. Around 1500 of these decisions call for government action at the national level and 1000 at the international level.

Let us now turn to some of the major issues addressed in Agenda 21.

### **Social and Economic Issues**

Chapter two of this section deals with international cooperation to accelerate sustainable development in developing countries. It basically addresses the issue of international trade. The two main points on which there was agreement were: firstly, the need to avoid non-tariff barriers for the sake of the environment and secondly, the importance of strengthening the Uruguay Round (commonly referred to as the "Green Round") and bringing it to a successful conclusion.

The conclusion drawn at the UNCED was that there is a double standard where trade issues are concerned: while the industrialized nations continue to press developing countries to liberalize their economies, they themselves are increasingly protectionist. The Uruguay Round has shown this quite clearly.

The title of chapter three is self-explanatory: "Combatting Poverty." Regrettably, however, the quality of this chapter is poor as the countries failed to make any clear commitments. This section of the document was drafted toward the end of the meeting, in part to make up for the fact that so much time had been devoted to environmental issues, but it undoubtedly generated a number of very interesting discussions.



Chapter four contains an evaluation of consumption patterns. This became the most controversial issue, with countries such as the US reluctant to even discuss consumption or production patterns. It became clear at the conference that the problem is not how many people live on the planet, but the per capita index of the consumption of energy, foodstuffs and resources in general. Consumption patterns and demographic dynamics were therefore discussed together.

The discussion of demographic dynamics included the topic of immigration. The developed countries regard this as the underlying problem and are alarmed at the high rates of South-North migration.

Lastly, chapter seven deals with sustainable human settlement development - in other words, the patterns and limits of urbanization and industrialization.

### **Development Resources**

Section 2 is the one that has most to say about natural resource management. One of the most important chapters is on the protection of the atmosphere. For the first time at such an important international forum, the forest was seen not only as a source or producer of wood, but as a huge deposit of CO<sub>2</sub> emissions. In other words, the developed nations saw the meeting as an opportunity to place a value on forests, especially tropical forests, as large CO<sub>2</sub> sinks and deposits.

In June 1990 US President George Bush had proposed the negotiation of a Forest Convention. He even expressed willingness to double the aid for the protection of tropical forest resources based on their value as carbon dioxide sinks.

This issue has economic implications for both countries in the North, which are largely responsible for CO<sub>2</sub> emissions, and nations in the South, with their large expanses of forest. This chapter is also closely linked to the subject of climatic change and the conservation of the ozone layer.

Chapter ten deals with planning and the integrated approach to land resource use and management in general, soil resources, and the need for a land use planning strategy. Measures to combat deforestation are dealt with in chapter eleven, which highlights the

issues on which priority action by the international community is required.

This section also addresses the topic of fragile ecosystem management and ways of combatting desertification. The international community is also negotiating a Convention on Desertification. The first international meeting to discuss this issue was held in Mali in August 1993. Other aspects dealt with are mountain resources, sustainable agriculture and rural development, the conservation of biological diversity and biotechnology management.

### **Strengthening the Role of the Main Groups**

One point worth noting is the fact that the negotiators at the UN Rio Conference mainly represented Environment and Ecology and Foreign Relations Ministries, but there were very few from Economy, Planning and Agriculture Ministries and Communications and Finance Secretariats. This suggests that there was no real intersectoral involvement in the formulation of Agenda 21.

It is therefore important that each sector now take the Agenda, analyze it, and perhaps restructure it in line with its own needs. We are now engaged in drafting national agendas, and no sector should be left out. The forestry issue can no longer be left entirely in the hands of environmentalists and diplomats; rather, they should be just two of the groups actively involved in bringing about these changes.

This section mentions Non-Governmental Organizations (NGOs). Profound changes have taken place as a result of civil society's loss of faith in parliaments and government institutions in general. The State apparatus has been trimmed and a body of non-governmental organizations has emerged. The result has been the creation of organizations of all kinds, ranging from environmental groups to development entities supported by the international financial community, through private foundations that have encouraged the process. This mobilization of non-governmental agencies should be welcomed, not resisted, by the forestry sector.

These changes should be taken into account as we formulate new development proposals, particularly as the role of the private sector and non-governmental organizations - and not only governments - has changed. This section also deals with the role of indigenous peoples, key players in the negotiating process at the Rio Conference.

In addition to Agenda 21, the NGOs produced a total of 46 Alternative or Non-Governmental Treaties that were signed by over 3000 organizations represented at the Rio Conference. These treaties reflect society civil's doubts about the negotiating process, which in many instances was handicapped by the lack of a common denominator among the different parties.

### **Means of Implementation**

This section deals with the financial resources required to move ahead with sustainable development. In fact, there was considerable disagreement as to where these new resources should come from.

It was estimated that the cost of implementing Agenda 21 could run as high as US\$ 125,000 million. The present cost of development, on the other hand, is officially put at US\$ 65,000 million. In other words, double the government development resources are needed to bring about a shift toward sustainable development. This figure represents 0.3% of the gross national product of the OECD countries. At the conference they were asked to increase their contribution to 0.7%, but the proposal was rejected. So far the Group of 7 (who recently met in Japan) and the OECD nations have not been able to reach agreement on their contribution to the transition toward sustainable development.

The developing countries not only want the developed nations to contribute more resources in the form of development aid. They are also strongly urging them to provide better market conditions, solve the issue of external debt and meet the full costs of the services provided by natural resources like forests. In other words, they are asking them to pay not only for the products they purchase, but for all the services that the forest ecosystem provides.

This section contains an important chapter on the transfer of technology. One of the main sticking points was intellectual property. As in the case of the Biodiversity Convention, it was not so much a convention to protect natural resources as to protect trade interests.

This section is also important because of its recommendations on national capacity-building. Recently the United Nations Development Programme (UNDP) set up a programme entitled Capacity 21 to channel a large amount of financial resources into strengthening

the capacity of developing nations. A priority area for the allocation of resources is the forestry sector.

## **THE SUSTAINABLE DEVELOPMENT COMMISSION**

A Sustainable Development Commission was set up after the Conference to strengthen the institutional structure. Composed of 53 countries, it held its first formal sessions in New York June 14-24, 1993. The commission reports to ECOSOC. The first meeting was extremely important as the Commission decided upon the procedure for analyzing the issues raised in Agenda 21 between now and 1997. A review of the Agenda is due to be completed by 1997, so it is vitally important that all interested parties undertake their own review of the document as soon as possible.

## **FOREST RESOURCE POLICIES**

One of the most important international developments in regard to forest resources was the review of the Tropical Forestry Action Program conducted by former Swedish Prime Minister Ula Ulstein. His report concluded that the Tropical Forestry Action Program had failed to halt deforestation and that only about 0.8% of tropical forestry resources have been sustainably managed. This evaluation highlighted the need for a World Forest Convention. Another important development in the field of forestry policy was the creation in 1983 of the International Tropical Timber organization (ITTO) to settle international trade problems and disputes between tropical timber producer and consumer countries.

Many participants at the Conference were hopeful that the World Forest Convention would be signed. However, the controversy at UNCED was extremely complex and basically centered on the following points:

1. The developed countries wanted the Forest Convention to be a convention on tropical forests. This was unacceptable to the Third World Nations, who opposed an international convention on tropical forests and insisted on the need for a convention that included both temperate and boreal forests.
2. The Third World countries also opposed the globalization of the forest issue, arguing that this play

into the hands of the North, specifically the G7 nations that dominate international organizations. For this reason, the Third World nations held to their position that forests should remain a national issue, respecting the sovereignty of each country.

Following the Conference a non-governmental Organizing Committee was set up and charged with creating the World Commission for Forests and Sustainable Development. This 20-member Committee is chaired by Mr. Ula Ulstein. One of the proposals put forward by the Committee has been the creation of a World Forest Commission similar to the Bruntland Commission.

The proposal was submitted to the UN Secretary General, who is now examining the possibility of creating this high-level Commission. Under the proposal, this Commission would examine the following issues:

1. International trade policies and new conservation schemes.
2. Forests as a means of subsistence.
3. Policies on natural resource management and the integrated management of soil use.
4. Agroforestry.
5. The rehabilitation of degraded lands.
6. Afforestation to protect water sources, create carbon sinks and produce timber.
7. The harmonization of national interests and international responsibilities.

The debate on forestry resources has highlighted a number of priority issues that should be considered when reviewing Agenda 21. These include the international trade in forest products, funding and economic incentives for forest management, assigning an economic value to all the goods and services provided by forest ecosystems, providing compensation for countries that conserve their forests (e.g., how and who is to compensate a country like Brazil for conserving its

tropical forest) and dispute resolution and consensus on joint policies by the agricultural, urban and forestry sectors. Finally, the question of the World Forest Convention remains unresolved, and it is hoped that the World Commission for Forests and Sustainable Development will permit dialogue and make it possible to reconcile national and international interests.

# **INTERVENTIONS FOR THE SUCCESS OF SOCIAL FORESTRY AND AGROFORESTRY IN LATIN AMERICA. GUIDELINES FOR INSTITUTIONAL AND POLICY RESEARCH**

**Ronnie de Camino Velozo<sup>1</sup>**

## **INTRODUCTION**

Everyone has agreed on the need for sustainable development. Forestry and agroforestry policies should be geared toward attaining this objective. The prevailing models have resulted in 200 million poor people and a rate of deforestation in excess of 7 million has. per year in the region (WRI 1991). The prevailing models must therefore be changed or modified in order to achieve sustainable development. We must push for realistic and viable types of programs. But we should also argue strongly for other urgently needed actions that may be viewed as naive and unrealistic because they bear little relation to current political conditions. The time has come for us to stop beating about the bush and speak clearly about the nature and extent of the changes required (see box).

We should adopt Habel's approach: "I am in favor of anti-policy. That is, policy not as a method and means of manipulating power or as the art of the possible, the practical and intrigue, but policy as ethics, practiced in service to the truth, as concern for one's fellow man, basically human and oriented by human measures. This kind of policy is probably highly impractical under present circumstances and difficult to apply in daily life. Nonetheless, I know of no better alternative."

**Source: Habel 1984.**

The success and expansion of social forestry is important. It is simply a question of finding ways of channeling the enormous potential that exists into real solutions instead of merely tinkering with the problem.

---

<sup>1</sup>

IICA/GTZ Project on Agriculture, Natural Resources and Sustainable Development. Vice-Chairman, CIFOR Board.

Social forestry and agroforestry<sup>2</sup> policy research priorities should reflect the urgency of the action required and the timeliness of the results. Research should be useful and either its methodology or its findings should make a constructive contribution to the resolution of key regional natural resource issues.

The following two examples may illustrate this point better:

- a) Two State Governors interviewed in the Amazon region said that although they were interested in the sophisticated research carried out by international centers, the overriding need was for studies on the application of technologies that are already available, markets for their products, acceptable, stable prices to meet the cost of sustainable management, modes of organization that offer financial and marketing advantages, knowledge of processing chains and ways of integrating the rural poor into them (TAC/CGIAR 1993).
- b) A study of national accounts and natural resources in Costa Rica (TSC, WRI, 1991) showed that development has been achieved at the expense of forest and soils. Even more importantly, it showed that on the upside there exists a large, very valuable resource - secondary forests - that is not presently included in national accounts but which could be harnessed as a economic resource through policy interventions.

Both examples suggest that investing in quality research on social forestry policies would yield rapid returns.

## **THE CONTEXT OF AGROFORESTRY AND SOCIAL FORESTRY PROBLEMS AND POLICIES**

### **Regional Problems**

The rate of growth in Latin America has been insufficient and usually measured in terms of the traditional yardstick used to gauge economic development: the growth of per capita income. The prevailing models have failed to improve income levels and distribution, poverty is growing and natural resources continue to be destroyed.

---

<sup>2</sup> For the rest of the document, when the term "social forestry" is used it should be understood as referring to both social forestry and agroforestry.



Conservation is not a priority. Social and environmental improvement is not the primary concern, so medium and long-term opportunities are being missed.

The regional problems that have a bearing on social forestry are as follows (UNEP 1990), (WRI 1990), (IDB/UNDP 1991):

- a) From the social and economic standpoint:
  - ▶ Demographic pressures
  - ▶ Inequitable income distribution
  - ▶ Land tenure
  - ▶ Poverty and the deterioration of the quality of life
  - ▶ Declining terms of trade
  - ▶ External debt
  
- b) From the environmental and natural resource standpoint:
  - ▶ Deforestation
  - ▶ Soil Degradation
  - ▶ Deterioration of water resources
  - ▶ Loss of biodiversity
  - ▶ Intensive use of agrochemicals

These problems stem from a complex social, economic, political, cultural and investment resources system. Systems of accumulative circular causation or positive feedback loops reinforce one another and exacerbate the social and natural resource situation (Meadows and Robinson 1985). Incomplete policy intervention models have failed to either reverse or check the processes that work against sustainable development.

### **The Context of Regional Policies**

Between 1950-1980 the region attempted to industrialize its predominantly agrarian and mining-based economies. An import substitution model was adopted to stimulate industrialization with an undervalued dollar and tariff barriers. Prices of agricultural products fell, but this was compensated for by public spending on the sector channeled into irrigation works, roads and subsidies, plus tax breaks for inputs and extensive stock raising, with support from the international

banking system. This model boosted the economy and agriculture but also led to indebtedness, a widening gap in living conditions between the cities and the countryside, a concentration of rural poverty and a significant deterioration in natural resources.

As a result of the crisis facing the developed countries in 1981, demand for the region's products fell, export prices slumped, interest rates rose and an unprecedented foreign debt crisis ensued (Bustamante, 1991). The region's ceiling of indebtedness was reached so that growth could no longer be sustained by borrowing. Production and employment and the terms of trade for agricultural products and natural resources all declined, and financial outflows from the region multiplied six times over. The measures adopted to deal with the crisis were: 1) the restructuring of production based on the region's comparative advantages and the opening up of markets to international competition, and 2) the balancing of national current accounts and the fiscal sector.

This recessionary adjustment was designed to achieve macroeconomic equilibrium and microeconomic efficiency. Industry was hit harder than agriculture as its growth had been tied to tariff barriers. Most countries were obliged to adopt this approach whether they wished to or not, but they have yet to emerge from the crisis and have experienced setbacks on the equity of income distribution, the destruction of natural resources and the deterioration of the environment.

Policies have led to increased pressure on natural resources. In theory the region is capable of supporting a large population, but there are imbalances between the load-bearing capacity, the distribution of resource ownership and access to technology and financial support mechanisms. Most ecologically rich and stable land is already spoken for, so the poor migrate towards the agricultural frontiers. Campesino squatters familiar with the farming methods used in densely populated dry and highland areas transfer them to the very fragile ecosystems of the humid tropics.

At the start of this decade the region's debt stood at over US\$ 400,000 million. The only way of paying it is by increasing exports often at the expense of natural resources and withstanding the protectionism of developed countries. Awareness of the problem has been limited as its negative effects have been slow to make themselves felt.

In the eighties there was growing world and regional concern for the environment and natural resources. In theory at least there was a shift away from the sectoral approach to natural resources, to a global approach that took into account the geography of countries and all production sectors (Bustamante 1991). The debate on the protection of resources intensified. There was opposition from some elements of modern production sectors and it was claimed that environmental policies curb investment. The developed nations reduced their imports of environmentally harmful products and those not produced using sustainable natural resource management practices. They in effect imposed a unilateral non-tariff barrier, as Latin American countries did not impose similar restrictions on toxic, non-disposable and non-biodegradable products imported from the North.

### Problems Addressed by Social Forestry Projects

In the circumstances described, countries are obliged to resort to all kinds of resources and strategies. Social forestry projects can make important contributions in the following situations (Gregersen *et al.* 1989):

- ▶ They slow deforestation by making forestry a viable economic alternative to the slashing and burning of forest. Natural forest management uses forest and non-forest products for the benefit of rural communities. Other options include the provision of services to protect forest cover and biodiversity and leisure and tourism services.
- ▶ They ease pressure on forested lands by helping to maintain agricultural and stock-raising productivity levels in marginal areas.
- ▶ They make it possible to recover areas degraded by inappropriate use through the cultivation of multi-purpose trees, including the production of biomass energy, forest products, forage, foodstuffs, etc.
- ▶ They are a key element of watershed management and stabilize land use in physical and economic terms.
- ▶ They generate employment in depressed areas and areas where there are strong demographic pressures.

- ▶ Lastly, they help to improve equity by substantially reducing rural poverty and improving income distribution.

In the face of the basically conflicting policies adopted by North and South to attain their respective objectives and protect their interests, the biggest challenge is how to improve sustainability and equity on a scale consistent with the size of the problem.

It is against this backdrop that social forestry activities and the policies that encourage them must be implemented.

## THE POTENTIAL ROLE OF SOCIAL FORESTRY AND AGROFORESTRY

Latin America is homogenous and heterogenous. Homogenous, in terms of its common history and European ethnic ties, mainly with the Spanish and Portuguese (Central and South America) and the English (the Caribbean), with their respective language, cultural and religious heritages. Heterogenous and diverse, in terms of its ecological conditions.

Any current classification can be used to identify agroecosystems. There are situations in which agroforestry and social forestry have a role to play in solving the problems, and others in which policy intervention would be required to increase the possible benefits.

Each situation has to be evaluated separately to determine whether social forestry activities could be implemented successfully and what changes and policies would be needed to remove the main hurdles.

### Tropical Areas with Limited Fertility Used for Agriculture

Low fertility areas cover 50% of the region. They include soils originally covered with tropical rain forest and *cerrado* and savannah currently used for agriculture and stock-raising. In both cases forestry and agroforestry technologies could be applied to make appropriate use of the land, either to encourage reforestation or make agriculture sustainable. Population density also varies, ranging from high in the dry Pacific regions of Central America and Brazil's *cerrado*, to low in the deforested tropical rain forest regions of the Amazon and Orinoco

**Basins.** In parts of these areas campesinos and small farmers and medium and large-scale farmers live side-by-side.

### **Desert and Semi-Desert Regions**

Desert and semi-desert areas cover a considerable proportion of the region (15-20% of South America and 15% of Central America). Though sparsely populated, the load and pressures in these areas are greater than the ecosystem can bear. Despite the fact that there are practically no trees, there is strong demand for fuelwood and animal fodder, especially for small animals. Agroforestry systems and forest plantations are needed in such areas.

### **Sustainable Tropical Forest Management and its Ecological Functions**

Forest management should provide a sustainable alternative to agriculture and stockraising on these fragile soils, one that does not destroy the resource. Management can generate timber and non-timber products on both the industrial and local scale. There are many different life zones, ranging from tropical rain forest to montane forest, including tropical conifer forests. There are tremendous opportunities for grassroots tropical forest management, but in practice few projects of this kind have been implemented (Quintana Roo, Pichis Palcazú). Generally speaking, natural forest management is marginal, almost non-existent.

### **Management and Protection of the Region's Genetic Resources and Wildlife**

Wild flora and fauna management should include the preservation of needed areas and the evaluation of biodiversity, domestication, cultivation, improvement, the synthesis of active principles where appropriate, the appropriation of patents and marketing by the communities, regions and countries that possess them. Social forestry projects could play a role in this, but as yet no large-scale activity has been attempted.

### **Management and Protection of Fragile Ecosystems**

Conservation and protection areas are needed, but with the communities themselves managing the resources, reaping the benefits and providing the State with a service that it has so far proved

incapable of performing itself. Social forestry projects integrated into forest use rights programs have an important role to play in this area. Generally speaking, these are sparsely populated areas, but they do attract squatters, either landless peasants or people who have been displaced from other regions. Actions could be geared toward buffer zones or even the management of core protected areas.

### **Management and Recovery of Degraded Environments, including Upland Regions**

Recovery of degraded lands calls for technologies, soil conservation, the rational use of water, permanent or temporary forest plantations, agroforestry systems for soil conservation and restoration, and the production of goods and services for the community (forage, food, fuelwood, timber, fruits, etc.). It is probably in areas such as these that there has been most experience with social forestry projects, and more successful examples are to be found.

### **Agricultural Areas where the Optimum Use of Agricultural Land must be Sought**

In prime agricultural areas a tree component can be incorporated on farms in order to protect crops and cattle from the effects of wind, improve the organic material content and soil structure, nitrogen fixation, etc. Social forestry could be implemented mainly in areas of high rural poverty.

### **CHANGES AND POLICY INTERVENTIONS CALLED FOR**

All the above situations could benefit from the promotion and implementation of different kinds of social forestry efforts. Policy intervention, whether it takes the form of new policies or the reform of current policies, should remove obstacles to the functioning of current community activities programs and projects or create the conditions for new actions on a scale consistent with the size of the region's problems.

There are challenges in many areas, mainly of an institutional nature and concerning policies, land tenure and access to resources and markets and marketing. They were identified by analyzing social forestry and agroforestry projects in the region (Current and Lutz 1992, Current 1991, Lutz *et al.* 1993, Kaimovitz 1992, IICA 1991).

## **Institutional Challenges in Terms of Beneficiaries**

Reorientation of institutions to serve a broader set of beneficiaries is perhaps the key intervention needed to guarantee the success of social forestry projects. Policy interventions should strengthen organizations by eliminating the rigidities that prevent communities from participating in accordance with their own objectives, resources and priorities.

For social forestry actions to be successful, the communities' current and potential resources must be mobilized. The communities have land, work and, in many instances, organizations. Projects and programs should aim to remove the restrictions that prevent communities from investing their own resources. This may mean the application and development of organizational technologies that allow communities to exploit the advantages of other more privileged groups (medium and large land owners and companies), such as access to capital, bargaining power in negotiating prices and quotas and the inherent advantages of the capitalist trading system. Efforts should also focus on enabling local governments and the target organizations of projects and programs to improve their management capability and capacity to absorb programs and projects on a large scale. Too many promising social forestry projects have failed due to a lack of institutional sustainability, even where this was one of the development objectives and strategies.

The main institutional challenge facing social forestry projects is: Why are actions that have apparently been accepted by a given community not extended to other communities, regions or the entire country?

Except in the case of Costa Rica and perhaps Peru, most current social forestry projects are small. They are isolated cases that are not subsequently implemented on a wide scale and may not in fact be sustainable beyond the life of the project when the support of some external agency terminates. Projects of this kind fail to provide a solution on a scale consistent with the size of the problem. They are merely partial solutions that make poor campesinos a little less poor but fail to become effective channels for redistributing income and development.

It is no exaggeration to say that the reforesters of Hojancha in Costa Rica have changed the course of reforestation in the country. From being a marginal activity with small farmers, reforestation is now well on the way to becoming one of the main forestry activities carried out in the country. These reforesters have taken the initiative in organizing themselves and have used AGUADEFOR, the Association of Reforesters of Guanacaste, to handle the reforestation formalities...

This activity by the leaders of Hojancha and their farmers is beginning to generate large-scale social reforestation in Costa Rica and has led to the introduction of the system of *Certificados de Abono Forestal* (tax incentives that subsidize 100% of the costs of reforestation) and, thanks to the success already achieved, the setting up of the national Forestry Development Fund for reforestation with small farmers.

Source: de Camino 1989.

### **Institutional Challenges Facing Government Agencies**

This is perhaps the second most important area of change. Government entities should be real facilitators of the expansion and consolidation of social forestry projects. Under the present arrangements institutions often tend to favor medium and large-scale beneficiaries.

Institutions should be reformed to make them more efficient. Some key considerations are:

- ▶ Regionalization of decision-making as a first step toward decentralization.
- ▶ Decentralization of decision-making and delegation of responsibilities to private and community organizations. With the trend toward the reduction of the State apparatus, institutions that are weak to begin with are undermined even further. Local community and private organizations should play a much bigger role in implementation.



- ▶ A change in the objectives of institutions, with a shift away from a management role to the promotion and support of sustainable activities. At present the State exercises control rather than promoting such activities.
- ▶ Stabilization of programs, budgets and personnel at levels consistent with institutional and economic efficiency. Make government procedures for forestry and agroforestry activities more effective and simple (planning approval, concessions, sustainable management standards). At present, procedures are so complex that the per-hectare cost involved is beyond the possibilities of small landholders and communities.
- ▶ Extension of program and project planning horizons beyond the time-frame of election campaigns and tailor them to the actual prospects for achieving sustainable development.

...government approval of applications from landowners who wish to sign up for forest incentives programs is completely extemporaneous and ill-timed as far as the work of preparing and planting the land is concerned. In many cases the people, at their own cost or risk or with the support of organizations, and in some instances because of the uncertainty and the lack of resources, are obliged to postpone execution of their projects.

**Source:** TSC/WRI 1991.

- ▶ Improvement of technical extension services as part of the decentralization process to provide an efficient service, appropriate technological options and an integrated approach to the extension problem. Separating agricultural and forestry extension services can be counterproductive; an integrated extension service would seem more appropriate, viewing trees as a mainstay of sustainable agriculture and stock-raising.

Legislation governing the use of land and forest is cumbersome, repetitive and confusing. But above all, enforcement depends on the political forces at work, short-term political developments and the official responsible for enforcing it at any given moment. There may be complete ignorance of the law or irrational and arbitrary decisions. This creates two serious and contradictory obstacles: the instruments intended to make rational use of the land and forests are inefficient; and the climate of uncertainty, which cools interest, and therefore investment, in activities such as forestry which take a long time to mature.

Source: Adames 1991.

Government entities should be real facilitators of the expansion and consolidation of social forestry projects. Under the present arrangements institutions often tend to favor medium and large-scale beneficiaries.

In short, the challenge facing government agencies is to reform institutions and make them efficient, simplify procedures, make them accessible to all kinds of landholders, gear them to promotion and decentralize them down to the regional and local level, delegating responsibilities to private community-based organizations.

### **Policies in Support of Social Forestry and Agroforestry Programs**

The main challenge facing us in the policy field is to really grasp the fact that economic development must be accompanied by institutional development and ecological sustainability. Social and environmental concerns should not take a back seat, as is the case at present.

We should be businesslike and ask ourselves whether we really want sustainable development, because it actually is necessary. If the answer is yes, then we should make substantial changes and not just carry on "business as usual."

Interventions should be geared to:

- ▶ Encourage the widespread use of time-phased rational incentives, with contributions from all the participants in the process and on a national scale. Systems of incentives should include general models, differentiated according to the client and specific situation and avoiding negative discrimination as in the case of Costa Rica (see box).

The system is unfair. Large landowners receive incentives in the form of CAFs, a subsidy covering the full cost of reforestation. Small landholders are funded half in CAFs and the other half in the form of credits provided by the Forestry Development Fund. Even so, farmers are willing to reforest their land on this basis, as if they only used the CAF, for which there are quotas, they would be unable to cover a large enough area.

Source: de Camino 1989.

- ▶ Establish mechanisms that internalize the costs of sustainable development and have the right to produce at both the national and international levels.

In many cases the State affirms that it possesses inalienable rights and responsibilities, for the administration of natural forests, but costs are very high and effectiveness very poor. It will take major decisions at the national level to really transfer resource management, with the appropriate limitations, to the groups capable of managing them, and generate better income distribution over the medium to long run.

### **Legal Challenges: Land Tenure and Access to Resources**

It is well-known that one of the main problems faced by social forestry projects is land tenure and ownership of the products generated. Campesinos and communities are reluctant to participate

in systems where the uncertainty surrounding land and product availability means that their investments and harvests are not guaranteed. Interventions are therefore required to:

- ▶ Make land rights absolutely transparent to campesinos and communities and even to allow landless campesinos to participate in some way in projects of the kind discussed in this document.
- ▶ Permit communities and land-owning and landless campesinos to take part in the bidding process for government-controlled forest reserves, thereby converting forest utilization contracts into a social forestry system that provides capital for joint ventures with firms familiar with the production technology and markets involved.
- ▶ Guarantee permanent ownership of trees and all tree and forest products (germplasm and wildlife). There are often restrictions on the use, availability and appropriation of goods and services of this kind.
- ▶ Permit communities to manage natural resources, transferring their management from the traditional public and private sectors. The term "private sector" is a broad concept that includes individual campesinos, communities and many non-traditional modes of organization.

Access to the management of a wider range of resources would make it possible to expand the concept of social forestry programs to include those that administer forest concessions, protected areas, national parks, fragile areas with their respective buffer zones, areas with potential for ecological tourism, etc.

### **Product Marketing and Markets**

Many ecologically and socially sustainable systems are unsustainable in economic terms. Many initiatives fail because they do not generate an acceptable level of income for the families involved or because they have no outlets for their products.

One of the main causes of uncertainty in tree growing in Central America and Panama are the laws and bureaucratic procedures governing the harvesting of trees. When planting trees there is no guarantee that the trees can be harvested by those doing the planting. Projects and programs have been able to get around this problem by working out agreements with government agencies as in Honduras (Sierra de Omoa), or developing an approved management plan for the entire project as in Guatemala (DIGEBOS-CARE-Peace Corps). These types of arrangements solve the problem for individual projects or programs but avoid the issue for more widespread tree planting activities. There is a need to make policy changes to remove this obstacle to tree planting and for projects to consider this problem in project development.

**Source:** Current, 1991.

Interventions that could improve markets and marketing include:

- ▶ Organizing producers to cope with the market and exert leverage in the trade and in determining quotas, prices and conditions.
- ▶ Internalizing the costs of sustainable land and forest management so that prices reflect the real economic, ecological and social conditions.
- ▶ Introducing procedures to develop markets and marketing and thus improve the returns on social forestry and agroforestry activities.

Markets present a two-fold challenge. On one hand, social forestry projects have tended to focus on agroforestry and forestry plantation activities. There are many other opportunities that are not being exploited, such as biodiversity, ecological tourism, the administration of large-scale forest utilization contracts, the administration of protected areas and national parks. On the other hand, we must tap into a higher percentage of the revenues generated

in the processing of forest products and through to the marketing of consumer goods of different kinds. Social forestry projects usually produce primary products for which low prices are paid. Most revenues are generated after the natural resource has been harvested and processed. The aim should be to develop the organizational technologies and organizational chains that would allow campesinos - the producers of wood, medicinal plants, the owners of the landscape values - to be partners in furniture factories, plants that process perfumes and aromatic herbs and hotels adjacent to areas with landscape values. Equity has not been achieved, and will never be unless imaginative forms of association and appropriation are achieved.

## GUIDELINES FOR POLICY RESEARCH

In the light of previous experience in the Latin American region, analyses of social forestry and agroforestry projects (see Chapter 4) and research priorities in recent years (de Camino, 1987) (Spears 1992) (Gregersen *et al.* 1992) (de Camino and McKenzie 1988), the following guidelines are proposed for policy research geared to the successful implementation of social forestry in Latin America.

### Role of Social Forestry and Agroforestry Projects

Emphasis should be placed on research into the role of social forestry and agroforestry projects in local and rural economies in the region. Projects of this kind are more commonly found in dry regions and in the Andean region. Demonstrating the importance of community forest development should be made an important element of the input provided to political decision-makers and future priorities for such efforts.

The following are some selected research areas:

#### *At the country level*

- ▶ Potential of social forestry as a part of national policy. An assessment of probable scenarios with social forestry and agroforestry projects, which could be regarded as a new form of new rural development project, could be a vital tool for sustainable rural development.

Forestry activity in the Municipality of Paragominas clearly produced the following results:

**Without Forest Management:**

- i) Sale of standing timber: NPV @ 10% in US\$/ha is 31.33
- ii) Sale of timber at the sawmill: NPV @ 10% in US\$/ha is 246.28
- iii) Sale of sawn timber: NPV @ 10% in US\$/ha is 619.37

**With Forestry Management:**

- i) Sale of standing timber: NPV @ 10% in US\$/ha is 36.02
- ii) Sale of timber at the sawmill: NPV @ 10% in US\$/ha is 211.23
- iii) Sale of sawn timber: NPV @ 10% in US\$/ha is 640.04

The conclusion is that the sale of standing timber in the prevailing conditions in Paragominas does not allow for the costs of sustainable management to be internalized. However, if the operation is integrated vertically (sustainable forest management, logging and transportation of timber, sawmill processing), then it becomes financially competitive and ecologically sustainable. Tropical rain forest could be sustainably managed if a vertically integrated model of social forestry is adopted.

**Source:** Author's calculations based on the figures included in Verissimo *et al.* 1991.

- ▶ Regional studies of the causes of deforestation. In each country and region of a given country there are different reasons for deforestation, soil degradation and the pace thereof. Pinpointing the causes contributes to the identification of appropriate policy measures, projects and components.
- ▶ Regional possibilities: the social forestry map. This would be a product of the action that has just been mentioned.

- ▶ Impact of energy policies on natural resources. This is the case of biomass fuels. Fuelwood is the world's number one forest product and an important cause of forest degradation, especially in arid zones. Energy policies should place a value on the forest and its management as an energy resource for the communities.

#### *At the regional and community level*

- ▶ Systems of accounts for farms and regions. Macroeconomic systems of natural resource accounts give a better idea of the contribution made by forests, soils and water to the economy. This is an area of recent methodological innovation which should also be developed at the farm and regional levels to give a better idea of the economic benefits of natural resource management and support the policies that foster them as important aspects of sustainable development.
- ▶ Financial and economic profitability of social forestry projects. The economics of sustainability, including plantations, agroforestry systems, natural forests, biodiversity, protected areas, national parks, energy, etc. Studies of this kind contribute a wealth of information that can then be used to underpin decision-making regarding projects and programs and regional and national policies. They also provide useful elements for the construction of natural resource-based financial and economic rural development models.
- ▶ Dependence on forest communities and trees. Studies of this kind highlight the importance of forest projects in rural areas and the priority of specific actions and components.
- ▶ Interactions within the agriculture-agroforestry-forestry continuum. Economic and social interactions. In rural areas and at the farm level there are soils with different potential uses. The uses and interactions between them should be taken into account to optimize a farm or region.



All the topics mentioned would increase our knowledge of the benefits and potential of social projects built around natural resources.

## Organizations

Studies on successful and unsuccessful social forestry and agroforestry projects highlight the need for local participation and the strength of organizations of beneficiaries and implementors as preconditions for such projects. Moreover, only the widespread strengthening of organizations will produce an important multiplier effect in the expansion of socially oriented natural resource systems. Therefore, there is a need to increase our knowledge of the options available for strengthening local organizations so that they can manage projects.

Some important issues in the region are:

### *On the role of projects in rural areas:*

- ▶ Attitudes toward trees and natural resources: needs and prospects perceived as the basis for policies. The satisfaction of the needs of the communities should be made a precondition of all projects.
- ▶ Perception of the rate of return by the communities: value placed on forests, trees and non-timber products. The criteria used by commercial and international banks are not the same as those applied by the community to gauge the benefits of a project. For a campesino, the daily return or security may be more important than a very high rate of return. There is a need to reconcile the needs of those who finance projects with those of the people who benefit from them.

### *On local organization and its potential:*

- ▶ Case studies of non-traditional projects (park management, control in protected areas, utilization of biodiversity) to orient a broadening of the scope and importance of social projects in rural development and natural resource policies.

- ▶ Information systems and decision-making at the local municipal and community level to support the effective management of social projects and determine the benefits of natural resource management at the broad community level.
- ▶ Case studies of models of rural enterprises and management and proposed alternatives, including studies of successes and failures. Earlier we stated that many successful forestry projects have only managed to make the poor a little less poor. Knowledge of management models would make it possible to insert enterprises created under projects into markets using modern economic and entrepreneurial (not marginal) arrangements.

### **Institutions**

Even the best community efforts often fail due to the limitations and inefficiency of the institutions involved. An important aspect of reform is the need to modernize government agencies to strengthen sustainable development based on social projects that involve natural resource utilization and management.

The research topics proposed call for a reinterpretation of recent trends in the modernization of the State. For example, they should include studies on the concept of democratic privatization, the provision of services through private groups, but in the hands of the communities, and access to land through the granting of concessions, but to the communities rather than large commercial concerns.

Research is needed to evaluate alternative approaches to:

- ▶ Reform of government agencies, decentralizing responsibilities, perhaps even down to the local level, permitting local officials to make decisions on projects, permits, the authorization of investments, etc.
- ▶ Transferring natural resource management to community organizations. All kinds of land should be opened up for reforestation - forest reserves, national parks, wetlands, etc. The communities should be

regarded as prospective concession holders of any state-owned resource.

- ▶ Reform of institutional procedures. Institutions should be evaluated and reformed, simplifying procedures to cut the costs of negotiations and formalities for both the State and private groups. A starting-point might be an analysis of the regressive consequences of present systems that also concentrate capital.
- ▶ Reform of extension agencies, transferring responsibility to local and community-based organizations. This should include the development of experimental extension models for the transfer of agroforestry and forestry models.

## Policies

With neoliberal economics in the ascendancy, incentives such as subsidies are out of fashion. It is maintained that interest rates should be the same for all activities, that direct subsidies should be eliminated. The most common types of subsidies in the past (fuel, stock raising credits, etc.) did much to destroy natural resources. Nonetheless, now is the time to subsidize social forestry activities to some extent, not so much as a subsidy as payment for environmental benefits.

To create the conditions that contribute to the success of social forestry, there is a need for research on:

- ▶ Assessments of incentives mechanisms, considering the objectives, the scope of the goals, the beneficiaries and the social, economic and environmental impacts.
- ▶ The prospects for introducing incentive mechanisms on a wide scale. Ways must be found of extending incentives that have proven to be successful at the local and regional level so as to make social forestry activities the rule rather than the exception.
- ▶ Contributing to the implementation of Agenda 21 in social forestry projects. Social forestry projects could

make a big contribution to the implementation of Agenda 21 in rural areas where they offer economic benefits, equity and sustainability.

- ▶ Democratization of concession policies. Democratizing access to resources is an important condition for sustainable development. We need to study ways of incorporating communities and landless peasants into concession policies.
- ▶ Tax policies. Analysis of policies to compensate for non-sustainable activities and subsidies for natural resource-based social activities.
- ▶ Role of social forestry projects in stabilizing land use.

#### **Access to Land and Other Resources**

This is a key area, together with elements of the other areas, that will ensure that social forestry projects do not simply make a few poor people a little less poor, but rather lead to successful local, wide-scale interventions and include the rural poor in global policies.

- ▶ Democratization of concession policies. As in section 5.4., this line of research should examine democratic privatization that would contribute to the attainment of sustainable development.
- ▶ Analysis of ownership of land, trees, plants, animals and biodiversity. There are too many different situations in each country where access to resources is concerned. We need to study the costs and benefits of affording the local population easier and broader access to resources, as well as the adverse effects of denied access.
- ▶ Systems that guarantee landless campesinos access to resources. Landlessness is a major problem and social tensions in rural areas will not be eliminated unless we can find efficient and less bureaucratic ways of providing access to the poorest of the poor.

- ▶ Study of community-based management of common property. This area of study offers real possibilities for all kinds of rural dwellers, especially landless campesinos and women.

## **Markets and Marketing**

We need to identify ways of internalizing the costs of environmental and social externalities and making prices reflect the "ecological truth" (von Weisacker 1989), in other words, ways of obtaining payment for the positive externalities of socially-oriented natural resource management. There is also a need to study strategies that ensure that the rural poor receive a bigger slice of the profits to be made from processing resources.

- ▶ Vertical integration of production. Case studies of forest management, extractive reserves, biodiversity, etc. We need to study forms of community appropriation or participation in the processing chain. In the case of biodiversity, this should include evaluation, domestication, cultivation, genetic improvement, synthesis of active principles, industrial processing and forms of appropriation within the chain.
- ▶ Evaluation of opportunities in non-traditional areas. The social management of natural resources for the community has largely been limited to forestry and agroforestry actions. There are other enormous possibilities in areas such as the management of national parks and different kinds of protected areas and ecological tourism. These would turn around the economies of many countries if their potential were harnessed effectively.
- ▶ Procedures for internalizing the costs of sustainable management. This was discussed in the section on research on changes in policy (Section 5.4). It involves interactions in the micro and macroeconomic treatment of cost internalization, also at the national and international levels.
- ▶ Analysis of production processes, costs, income, and marketing margins. Most social forestry projects face

serious problems at the point where harvesting begins, as they are often seen as ways of creating employment and improving local incomes, but are not geared to the market. Analyzing previous experiences could help us to plan future activities better.

- ▶ Strategies for involving the communities in the process, with real rather than marginal participation. Community participation in the planning of social forestry projects has taken different forms. An analysis of previous experiences could help improve the design of effective participation in future activities.
- ▶ Patterns in the demand for and use of tree and forest products by rural dwellers. Local markets and their potential expansion are important markets for social forestry activities.

### **Conditions for Policy Research**

Now let us turn to certain points that apply to policy research in the field of social forestry and agroforestry as well as other areas of policy research.

Sustainability means that the processes in different areas of social life are economically viable, socially acceptable and ecologically sustainable. Furthermore, we must think in global terms and act at the local level, while endeavoring to achieve a global impact. All this calls for change with a capital "C". This fact must be kept very much in mind and the language of forestry and agroforestry policy research should be candid, addressing the need for change unequivocally and not clinging to dogmatic ideas about prevailing or previous models. We should not limit ourselves ideologically if we are aware of the weaknesses of a model, or part of one.

The given label "social forestry" is limiting due to the approach that has been adopted hitherto. Ideally we should use a broader term - "Social Activity in Natural Resources," for example. Then we could talk about the use and processing of biodiversity, ecological tourism, national park management and community management and utilization of wildlife.

We have not mentioned the gender issue in this papers we have no wish to make a politically-correct comment of the kind to be found in many documents published by influential institutions. It should be a given fact that in dealing with the problems of communities we include women, children, men, young people, different races and ethnic groups. We should make every effort to help resolve the problems of all these groups without making artificial distinctions. In our efforts we should always keep in mind the status of groups that are discriminated against, minorities or sectors of the population who do not enjoy the same rights as others. In this context, the gender issue is a valid concern.

Another key issue is participation. Numerous studies have emphasized the fact that the beneficiaries must be involved in the process if social forestry activities are to be successful. But it is not the whole truth: the beneficiaries should also participate in the design of actions and research.

We Latin Americans should be active researchers in this and other fields. We can hardly blame scientists from the developed countries for being interested in the region. But it is not logical that 80% of the books and proceedings of workshops and congresses on Latin America's tropical regions should be written by experts from the North. We should participate and insist on being allowed to participate. We are not even strengthening our research centers. Indeed the approach to the problems and solutions is too extra-regional. We should be open to science, but on our terms. On occasion we find ourselves in the ridiculous position of trying to secure funds for third parties to conduct research into our problems when there are no funds for our own experts.

Lastly, two other important groups should be involved in policy research and the social sciences in general, even though they are not researchers: policy-making bodies and individual decision-makers, and politicians who can contribute with their practical experience and would provide us with a ready mean of transferring our results.

## REFERENCES

- ADAMES, I.; SANTOS, B. 1991. El Plan Sierra. República Dominicana. "Una experiencia de Ecodesarrollo en Laderas Tropicales", in Memorias: Taller de Agricultura Sostenible en las Laderas Centroamericanas. IICA. San José.
- BUSTAMANTE, J.A. 1991. Conceptos sobre Políticas de Desarrollo Nacional y Sustentabilidad de los Recursos Naturales. Informe Consultoría. Proyecto IICA/GTZ. San José.
- CURRENT, D. 1991. Forestry for Sustainable Development: Experiences from Central America and Panama. Forestry for Sustainable Development Program. U. of Minnesota, CATIE. Turrialba.
- CURRENT, D.; LUTZ, E. 1992. A Preliminary Economic and Institutional Evaluation of Selected Agroforestry Projects in Central America. The World Bank. Environment Dept. Policy and Research Division. Divisional Working Paper No. 1992-38. Washington.
- DE CAMINO, R. 1987. Some Considerations about Tropical Forestry Research in Latin America. Background Paper. Bellagio Forestry Task Force. Washington/New York.
- \_\_\_\_\_ ; MCKENZIE, T. 1988. The Needs of Socio-Economic Forestry Research in Central America. Some Considerations. In Data Base Management Applications in Forestry Research. Proceedings of an International Workshop. CATIE. Turrialba.
- \_\_\_\_\_. 1989. La Influencia de una Comunidad en la Política Forestal de un País. El Caso de Hojanca de Guanacaste en Costa Rica. Manuscript. CATIE. Turrialba.
- GREGERSEN, H.; DRAPER, S; ELZ, D. 1989. People and Trees. The Role of Social Forestry in Sustainable Development. EDI Seminar Series. The World Bank. Washington.
- GREGERSEN, H.; ORAM, P.; SPEARS, J. 1992. Priorities for Forestry and Agroforestry Policy Research. Report of an International Workshop. IFPRI. Washington.



- HABEL, V. 1984. Politik und Gewissen. Essay. In *Am Anfang war das Wort*. 1990. Aktuell rororo.
- IDB/UNDP. 1991. *Nuestra Propia Agenda*. Comisión de Medio Ambiente de América Latina y el Caribe. Washington.
- IICA/CIAT/CATIE/CIMMYT. 1991. *Agricultura Sostenible en las Laderas Centroamericanas. Oportunidades de Colaboración Interinstitucional. Memorias del Taller. (Proceedings of Workshop)*. San José.
- KAIMOVITZ, D. 1992. *La Experiencia de Centroamérica y la República Dominicana con Proyectos de Inversión que Buscan la Sostenibilidad en las Laderas. Seminario Agricultura Sostenible en América Latina*. IICA/IDB. Washington.
- LUTZ, E.; PAGIOLA, S.; REICHE, C. 1993. *Lessons from Economic and Institutional Analysis of Soil Conservation Projects in Central America and the Caribbean*. ENVLW. World Bank. Washington.
- MEADOWS, D.H.; ROBINSON, J.M. 1985. *The Electronic Oracle. Computer Models and Social Decisions*. John Wiley and Sons. New York.
- MUCIA/EPAT. 1993. *Draft: Third Annual Workplan, Fiscal Year 1994. Environmental and Natural Resources Policy and Training Project*. Washington.
- SPEARS, J. 1992. *Priority Areas of Forestry/Agroforestry Policy Research in Africa that Could Benefit from Support by the CGIAR System. Background Paper. CGIAR/FAO Agroforestry/Forestry Policy Workshop*. Nairobi.
- TAC/CGIAR. 1993. *Report of the First External Programme and Management Review of the International Centre for Research in Agroforestry (ICRAF)*. Rome.
- TSC/WRI. 1991. *Accounts Overdue: The Depreciation of Natural Resources in Costa Rica*. San José/Washington.
- UNEP. 1990. *Plan de Acción para el Medio Ambiente en América Latina y el Caribe*. Puerto España.

- VERISSIMO, A.; MATTOS, M.; TARIFA, R.; BARRETO, P.; UHL, C. 1991. Logging Impacts and Prospects for Sustainable Forest Management in an Old Amazonian Frontier. Manuscript. AMAZON. CPATU.
- VON WEIZSACKER, E. 1989. Erdpolitik. Okologische Realpolitik an der Schwel zum Jahrhundert der Umwelt. Wissenschaftliche Buchgesellschaft. Darmstadt.
- WRI. 1990. Recursos Mundiales 1990-1991. América Latina, Un Resumen de sus Recursos y Ambiente. Washington.
- WRI. 1991. Pacto para un Nuevo Mundo. Washington.

**COUNTRY DOCUMENTS**

# FORESTRY AND AGROFORESTRY POLICY RESEARCH IN COSTA RICA

Guillermo Arias<sup>1</sup>

## INTRODUCTION

Costa Rica has a few isolated, mostly inconsistent rules in the form of laws, regulations, decrees, national plans and sectoral plans. However, no true, clearly defined policy on forestry research states how forestry development should be oriented. In the absence of a coordinated general policy, national and sectoral plans have taken no consistent direction. Law enforcement has failed to provide an effective response because policies are not clearly defined.

The government has adopted a number of policies to foster forestry development by creating and implementing incentives. However, because these incentives do not fit into any consistent general policy, they have failed to produce the desired results. Paradoxically, the government has simultaneously introduced a number of disincentives placing severe restrictions on development of the sector. This is the direct result of the lack of an appropriate forestry policy clearly defining the government's role as promoter, regulator and facilitator.

## PRESENT SITUATION

Due to changes in macroeconomic policy worldwide, and the process of market opening into which the country has plunged, major efforts have recently been undertaken to define and establish consistent forestry policies with a view to the medium and long term. Two processes in recent years provided an opportunity to analyze the problems of forestry policy. The first was the preparation of the "Strategy for Sustainable Development" (ECODES) and the other was the Forestry Plan of Action (PAF).

In the wake of these two efforts, and in view of the pressing need to devise clear, precise policies that will set the standard for sustainable forestry development, the Agency for International Development (AID) funded a research project by the Tropical Science Center entitled "Study of Forestry Policies for Costa Rica." The public

---

<sup>1</sup>

National Director GTZ-COSEFORMA, San José, Costa Rica.

and private sectors were included in the study so that the resulting policy definition would be based on consensus.

At the same time this effort was underway, the World Bank prepared a document entitled "Review of the Forestry Sector," setting out a range of policy guidelines and strategies. The document was recently released for analysis and discussion by the forestry sector and natural resources groups.

These two documents provide a frame of reference for designing policy. The next step will be to have them adopted officially and to implement them, so that the forestry sector can successfully adapt to today's economic policy environment and thus exploit more fully our comparative and competitive advantages, boosting the profitability of forestry activities.

## **RELATED INSTITUTIONS AND ORGANIZATIONS**

The country has a number of bilateral agencies, nongovernmental organizations, private forestry associations and national and international research centers that play an active role in the forestry sector and are involved to some extent in implementing or setting policies for forestry and agroforestry.

Because these bodies are autonomous and their activities are very heterogeneous, the government has been unable to coordinate their work and channel available resources efficiently. Most of the current projects involve forestry research, protection and conservation of ecosystems, silviculture, land use and institutional and industrial development.

The main donor countries in the forestry sector are: Holland, the United States, Germany, the United Kingdom, Finland and Sweden.

The most important NGO's with projects for forest protection and social forestry are: the World Wildlife Fund (WWF), the International Union for the Conservation of Nature and Natural Resources (IUCN), the Nature Conservancy (TNC), the Pan American Development Fund (PADF) and Conservation International (CI).

Among institutions of higher education, the University of Costa Rica (UCR), the Technological Institute of Costa Rica (ITCR) and the

---

National University (UNA) are involved in developing forestry research and nature conservation projects.

International institutions engaged in forestry research include the Tropical Agriculture Research and Training Center (CATIE) and the Organization for Tropical Studies (OTS).

Bilateral donor agencies funding projects for the forestry sector include the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), GmbH, the United States Agency for International Development (USAID) and the Overseas Development Administration of the United Kingdom (ODA).

Of all the research being done in the country's forests, descriptive studies are the most numerous, given the level of international interest. There is no government-sponsored research focusing on the design of clear, specific policies to promote the development and consolidation of the forestry sector. Instead, the existing efforts are very specific, disperse and uncoordinated.

## **STATUS OF RESEARCH ON COMMUNITY-BASED FORESTRY AND AGROFORESTRY POLICIES IN CENTRAL AMERICA**

**Carlos Brenes Castillo<sup>1</sup>**

Little has been done in Central America to relate forest policy research to community forestry. Only in recent years has the issue of community forestry begun to appear on the agendas of policy-setting bodies and in the formulation of programs and projects. However, research on policies associated with this field is practically non-existent.

Even though many community forestry initiatives are being promoted, little or no policy research is taking place. Below is a listing of the few policies and actions that do exist in international organizations and national institutions.

1. A social forestry project in Honduras, part of COHDEFOR, is a pioneering approach to community-oriented policies. Until a few months ago, it was participating in a systematic, conscientious study of forestry policy and an evaluation of community impact.
2. In Costa Rica, a department of campesino forestry development was created by law. More particularly, this department has a policy for reforestation incentives, directed at campesino populations. This is another field that needs to be explored, as to date, only a few preliminary evaluations are available.
3. Clearly, most of the international organizations have explicit policies to support the forestry work of campesino and indigenous groups, and many projects now underway or being negotiated, especially the PAF, are embraced by these policies. Therefore, the components and objectives of international cooperation need to be identified, and the institutional capacity to respond to these new needs should be assessed.
4. Recently, the Forest Plan of Action for Central America, the Central American Commission for Environment and Development, and the Program for Forests, Trees and Rural

---

<sup>1</sup>

Regional facilitator for Central America of the FAO Forests, Trees and Rural Communities Program. FAO, San José, Costa Rica.

Communities held a meeting in Guatemala City for forestry directors and coordinators of forest plans of action. The meeting forged a number of agreements on community forests and the role of government forest services. These agreements are expected to prove very useful for community forest development. The next step is to investigate the conditions needed for implementing the policies defined in Guatemala.

5. A core issue is the fact that most of the opportunities for community forest development in Central America have been affected by macroeconomic trends, especially structural adjustment policies. It is important to study the ways in which macroeconomic policies affect the social aspects of forestry production.
6. It is a known fact that the shifting agricultural frontier in Central America is the main force linking forest dynamics with agricultural trends and the dynamics of campesino and Indian populations. Land tenure thus becomes a critically important issue. Several excellent initiatives already exist for linking agricultural and campesino settlement dynamics with forestry development processes, especially the FAO/Holland/IDA project in Guanacaste, Costa Rica.

One research priority should be to examine policy options for situations where the agricultural frontier is shifting, and find ways of harnessing these dynamics for the benefit of forest resources.

7. Finally, it is a fact that community participation in policy setting is negligible, and very few mechanisms are in place for taking into account the views and preferences of the rural populations that make up a major contingent of the forestry sector. A key priority in the next few years should be to develop research on mechanisms to boost community participation in policy setting, if there is to be any hope of meeting the many needs of campesino and indigenous populations in Latin America.



**FACTORS IN POLICY FORMULATION  
FOR THE FORESTRY SECTOR:  
THE CASE OF CHILE**

Ignacio Cerda V.<sup>1</sup>

**INTRODUCTION**

Forestry activity in Chile is growing exuberantly. Its buoyancy can be attributed to numerous causes, including the favorable economic setting, modernization of the country and the presence of a strong private sector.

Nonetheless, major efforts are still needed, by both public and private agents, to incorporate rural populations that inhabit forested lands and live on the fringes of the formal economy. Such a process must be based on accurate knowledge of real conditions, which can be acquired only through research activity. Basic and applied research and technology transfer studies are the only means to guarantee that current growth rates can be sustained into the twenty-first century and that multiple structural constraints can be overcome, including geographic distance from other country markets, a need for faster growth of forests, more product diversification, the need for more added value, and the like.

Only through research can sound regulations be developed, the need for a "country strategy of forest development" be defended, and the necessary consensus be reached. Moreover, timely development of research will generate new knowledge and alternatives for pursuing economic development with social equity and minimizing undesirable environmental impacts.

This document will describe the present status of research on forestry and agroforestry policies, and the institutions involved. It will emphasize the influence of the current environment for forestry activities, the challenges ahead, and the conversion of Chilean forests into farmland.

---

<sup>1</sup> Head, Division of Economic Studies. Forestry Institute, Santiago, Chile.

## **FORESTRY POLICY RESEARCH**

Research for policy design is particularly complex in the field of forestry because the structural components of the sector are so heterogeneous. Such research needs to proceed with caution because forestry activities have become very important to the economy and society.

The political and technical-scientific circles involved with the forestry sector are fond of saying that past sectoral development policies were built on the country's comparative advantages. By contrast, new sectoral policies must target competitive advantages. The difference is very telling. When comparative advantages prevailed, people had to do little more than tap into them. Now, however, it will be necessary to create, maintain and even accentuate competitive advantages, and at the same time, learn to use them more and more effectively.

Comparative advantages provided a basis for the growth of economic activities in forestry, especially from 1974 through 1992. Policies and regulations were consolidated during this time through informed decisions on opening of external markets, national and international credits, training of technical professionals and other human resources, opening to foreign investment, swapping foreign debt for domestic investment, and research and information (markets, basic statistics, future scenarios, action proposals).

The development of comparative advantages brought positive results in macroeconomic terms. Forestry exports increased by a factor of 30 (from US\$39 million to US\$1.17 billion). Forestry exports expanded from three percent to 12 percent of Chile's total exports. During this period, the country acquired the capacity to plant over 130,000 hectares of forest per year, and by 1992 had 1.5 million hectares of artificial forests, a supply which is expected to double in the next few years.

All this paints the picture of a true boom in exports and plantations for the country, overshadowing the neglect of other important issues for the forestry sector. Overlooked were such issues as the native forest, the rural society whose life was bound up with this resource, the development of new products, the small- and medium-scale companies serving the domestic market, production by

small-scale producers, the forest chemical industry, and concerns for social issues and integrated watershed management.

In general, there were no studies or research that would lead us to a highly competitive strategic vision, or help us fit real problems into a system-wide, long-term structure. The country's great concern now is how to develop the second phase of its export boom. At issue is Chile's ability to compete, which alone can sustain the vitality of the export industry.

### Challenges

Today's challenges fit into a setting shaped by world-wide trends, summarized as follows:

- ▶ Globalized markets are ever more demanding.
- ▶ Wealth is being created at an accelerated pace, depending more and more on exchange of information.
- ▶ A new mentality constantly shapes production to the needs of the customer.
- ▶ The organization of knowledge depends more and more on the free flow of information.
- ▶ The multiplicity of organizations produces a true flood of information.
- ▶ Innovation is a key factor for gaining position.
- ▶ Microtechnologies available at the local level provide capabilities that used to be accessible only on a national scale.

Given all these factors, the forestry sector is facing many challenges which hold profound implications for policy research:

- ▶ How to incorporate environmental precautions in forestry operations.

- ▶ Improving the quality, productivity and flexibility of production, through the latest technologies and training.
- ▶ Enhancing site productivity with genetic engineering, technologically advanced nurseries, and intensive forest management.
- ▶ Internationalizing Chile's forestry investments, targeting countries with attractive or competitive product supply markets.
- ▶ Finding ways to solve problems with inadequate infrastructure that are affecting the export sector.
- ▶ Modernizing government institutions so they can respond to the dynamics of the sector.
- ▶ Building a national strategy for early identification of new products and markets.
- ▶ Incorporating small companies into forestry development.
- ▶ Introducing environmental education programs in the schools.

### **Lessons to be Learned**

Two major lessons can be learned from the experiences of the forestry sector in Chile:

- ▶ A positive lesson is the case of plantation development with the fast-growing Monterrey pine. The private sector set about very aggressively establishing these plantations, with support from public agencies and economic policy instruments. Support also came from the Forestry Institute, which generates basic data, applied information and technology transfer. As a result, many useful tools were created to facilitate decision-making on sectoral policies and private projects. Other studies examined business opportunities and the economic performance of the

forestry sector. A number of government and private organizations provided additional support Appendix 1.

- ▶ A negative lesson can be learned from the fate of the native forest, which was supported by no clear policies on forest improvement, productive technologies, market studies or information. This resource, holding no priority, was relentlessly degraded and undervalued economically. Disinformation abounded, with vague ideas about what rules were needed. All this can be attributed to the paucity of research.

As the twenty-first century approached, Chile's forestry sector adopted a strategy that relied heavily on comparative advantages. In particular, it emphasized the presence of a native forest and the availability of good soils for plantations. Today, however, the country is faced with the challenge of finding competitive advantages, associated with increased productivity and more innovation. Only these can mobilize all available resources based on a principle of environmental sustainability.

The most pressing task is to lay the groundwork for modernizing production structures. If the country is to consolidate a policy consistent with today's needs, it must have more knowledge of the type produced by research. Such modernization will build a foundation for making equitable improvements in the quality of life and for guaranteeing social justice to the population. This, in turn, requires an open economy able to sustain high rates of savings and investment.

It is a goal that lies within reach, but only if technology and applied science are included as factors in modernizing production structures and thus boosting competitiveness and productivity. Private-sector participation is essential, and the government must also play an active role. No technology development project can succeed without a shared sense of commitment and effort.

### **Encroachment of Farmland by Forests**

Most countries eliminate their forests to create space for farming and livestock. The opposite is occurring in Chile. The trend is to forest ever-increasing amounts of farm and ranch land, preferably with eucalyptus. High profits are being earned on forest plantations, especially with the high demand for short-fiber pulp wood.

Analysis using different time horizons shows that on the average, a eucalyptus plantation can produce 2.75 times as much profit every year as traditional crops. New uses of farmland can be clearly seen by comparing changes in the nation-wide Gross Geographic Product (GGP) with changes posted by the agricultural sector. In 1991, the GGP for agriculture increased by 1.2 percent, while the GGP for the entire country grew by six percent. Even more dramatic, in 1992, the total GGP grew by 10.4 percent, while the GGP for agriculture crept up by only one percent. Similarly, the amount of land planted to all traditional crops has declined by 20 percent over the past five years.

The high profit margins available on forest plantations, coupled with the declining profitability of farming, has brought profound transformations in land tenure. In the southern part of the country, large forest complexes are buying up extensive spreads of farmland which have become less profitable.

Studies in many countries around the world have shown farm subsidies to be one of the causes of deforestation.

## **POLICY FORMULATION FOR THE FORESTRY SECTOR**

### **Natural Forests**

It would behoove the country to ward off the degradation of natural protective forests by creating carrot-and-stick policies to encourage natural or artificial repopulation, restoring the plant cover in these forests. Two different positions are being taken concerning natural productive forests:

- ▶ Government control should be continued, so that tree farming will not alter the basic nature of the forest (for example, with exotic plantations).
- ▶ Land owners should be more free to use whatever cropping methods they desire, under the condition that they guarantee soil protection.

Defenders of both positions advocate the use of subsidies and technical assistance to encourage good management practices.

Because this field is not widely understood, research will be needed if resulting policies are to be built on a firm foundation. It may also be worthwhile to conduct research on such important areas as:

- ▶ How much should be given as incentives. The amount should be economically attractive to the private sector, and should continue to flow until the cultivation of native forest becomes a habitual practice.
- ▶ The preservationist position. Although this approach is justified for Chile's native forests, "it has led the debate away from the one resource which most needs to be used sustainably: soils suited only to forest use, which today are uninhabited" (F. Hartwig).
- ▶ Keeping the discussion current by focusing on relevant technical and economic issues; among other things, this means differentiating the types of native forest in terms of their potential contribution to society, and evaluating them on the basis of land use capacity of the soils in which they grow, particularly in the case of protection and cultivation.

In short, many issues still need to be explored, ranging from silviculture to marketing strategies, and research findings need to be applied in designing policies.

### Plantations

It is important to continue encouraging the development of new plantations, which benefit the environment, control erosion, improve watershed management and remove carbon from the atmosphere. Nonetheless, all plantations should be compatible with environmental conditions. More research is needed in such areas as soil acidity assessment, site productivity, water consumption, silvicultural practices, biological pest control, genetic improvement, genetic engineering techniques, effects on flora and fauna, and the like.

## **Forest Industry**

Chile has already developed a large-scale, diversified forest industry. As time goes by, more and more demands will come to bear on this activity. One of the main concerns today is pollution control, an area in which government measures are inadequate and antiquated. Efforts are being made to approach this need realistically and encourage public participation, without obstructing the vigorous development of the activity and the requirements of international markets (ISO 9000 for the European Economic Community).

One of the challenges facing forestry operations and industrial concerns is to develop technology that will maximize yield and automate processing.

## **Marketing Strategies**

Marketing strategies need to focus on developing new markets and products and incorporating small- and medium-scale timber producers and manufacturers.

## **NEEDS FOR SECOND-STAGE EXPORTING**

Our country is witnessing a process of expanding demand that has unleashed a creative spirit eager to boost productivity and thus fulfill our potential to produce more and better per capita. This is the only valid way to respond to the challenges of international competition, and it holds the key to sustained growth over time, with greater equity. Only by expanding the wealth generated by each Chilean can the country significantly improve its opportunities and offer a better quality of life.

As growth accelerates, challenges multiply. The economy is rapidly globalizing, regional markets are setting up more trade barriers, and competition is on the rise. Productivity and quality are now the keys to competing effectively. Against this backdrop, the comparative advantages on which Chile based its early export business cannot be easily sustained. Even our success has a downside, as it depresses the exchange rate and raises the cost of labor. At the same time, our country, like the rest of the world, has developed a strong interest in rational use of natural resources and conservation of the environment.



In this general setting, human resources training and technological innovation assume overriding importance if we are to acquire lasting competitive advantages. Faced with such a challenge, the government has been promoting innovation. It has created a broad range of policy instruments clearly oriented toward meeting the needs of productive development. It will train workers and business people, fund initiatives for research and technology development, promote markets, and so forth.

### **Science and Technology Program**

This program went into effect in 1992. Its objective is to encourage technology innovation in Chilean companies and boost capabilities and high-quality results in research and development by the private sector, universities, technology institutes and research centers, all closely joined to the country's production needs.

The program handles three financial instruments, each with clearly distinct users and goals:

- ▶ The Fund to Promote Scientific and Technological Development (FONDEF)--funds research and development projects for the production sector.
- ▶ National Fund for the Development of Technology and Production (FONTEC)--funds projects for innovation in technology infrastructure.
- ▶ Science and Technology Development Fund (FONDECYT)--funds research projects seeking excellence.

These programs cover the full range of innovative activity, from basic scientific research, applied research and technology development, to production innovation in private companies.

The Ministry of the Economy, as coordinator of this initiative, channels the resources through several different entities. The Production Promotion Corporation (CORFO) implements the FONTEC, and the National Scientific and Technology Research Commission (CONICYT) handles the FONDEF and the FONDECYT.

## **CONCLUSIONS**

Forestry policies in Chile have changed and evolved over the years, but three essential factors have been clearly missing: policies have failed to be comprehensive, consistent and logically constructed. Various government administrations have expressed objectives, designed draft bills and scheduled actions in response to anticipated problems or needs. As a result, forestry policy is pocked with legal gaps and must be considered incomplete.

Developments today are actually a response to macroeconomic, social and political conditions, which is the only reason why the rules of the game have remained stable. Although the state continues to play a subsidiary role, a number of instruments emerging inside the forestry sector have had a positive effect on recent trends. These include very active participation by the private sector and the appearance of numerous organizations associated with applied research and technology transfer.

The Forestry Institute (INFOR) is particularly worth mentioning. It has been generating applied research and technology transfer for over 30 years, especially in the area of plantations. It has also supported development with its base of statistical and economic data, environmental impact assessments, market studies, research of business opportunities, and others. In short, it has provided authorities, the business sector, researchers and others with signals that minimize investment risks and lead to the growth of highly profitable projects.

However, no institution has made any significant progress in studying the native forest. None has developed sound methods to provide a foundation for policies addressing management, exploitation or industrialization in this subsector.

Chile's forestry sector now faces the inescapable need to take on new challenges in today's framework of strategic planning, incorporating a systems view. Dynamic, flexible policies need to be developed, based on the powerful arsenal of research that will provide both technical and political arguments.

Once the economic, social and environmental approaches have been established, it will be necessary to open a round table process for building consensus among opinion leaders in political circles, the

academic world, private business, social groups and others. Together they can identify any problem areas, and thus prevent incidents of dissent, doubt and challenges. This group should set out a single strategy whose overriding mission would be to maximize benefits for the country, free of the myths and biases that arise in the absence of a technical foundation.

Research plays an essential role in modernizing forestry policy. It should be based on clear consensus, and although coordinated with public policies, it must outlive government administrations. It must never be forgotten that forestry production depends on a long-term view. The turnover time for a forest is much longer than that of other production activities.

*Ministry of Agriculture*

- ▶ Forestry Corporation (CONAF)
- ▶ Farming and Livestock Service (SAG)
- ▶ Agricultural Development Institute (INDAP)
- ▶ Agricultural Research Institute (INIA)
- ▶ Division of Studies and Budgets (DEP, previously ODEPA)

*Ministry of the Economy, Development and Reconstruction*

- ▶ Production Development Corporation (CORFO)
- ▶ Forestry Institute (INFOR)
- ▶ Natural Resources Information Center (CIREN)
- ▶ Technological Research Institute (INTEC)
- ▶ Technical Cooperation Service (SERCOTEC)
- ▶ Fund for the Development of Technology and Production (FONTEC)

Government entities attached to other ministries also run programs that address or have an impact on the forestry sector.

All institutions of the public administration follow the same process in planning their activities. First, programs proposed by the different ministries need to be consistent with national and sectoral policies. The various departments of each ministry propose their own programs of activities and investments, including cost estimates. These proposals are reviewed for approval by the Ministry of Planning (MIDEPLAN). Once plans have been approved, the agencies submit their proposals to the planning units of their particular ministries. The proposals are approved again and are submitted to the Ministry of the Treasury for review. This ministry compiles all the proposals and drafts the National Budget, which then goes before the Congress for approval. If it is approved, the Ministry of the Treasury authorizes

disbursement of funds to finance and implement the programs of the ministries.

### **Private-Sector Institutions**

Some of these institutions are profit-making; others are non-profit.

#### *Profit-making institutions*

- ▶ **Forestry industries.** This includes both primary forestry industries, which process wood extracted directly from the forest (sawmills, board manufacturers, pulp and paper plants), and secondary industries, which obtain previously processed forestry products as their raw material (furniture makers and product manufacturers in general).
- ▶ **Owners of forests and forest lands.** This includes individuals and organizations using forests and forest lands for recreation and for producing wood or fuelwood, for sale or domestic use, whether their holdings are large or small.
- ▶ **Service enterprises.** This group consists of shipping companies and other contractors working for third parties (businesses or individuals), doing such jobs as establishing plantations or working the forests and tree farms. It also includes forestry consulting firms.
- ▶ **Education and training institutions.** This category includes private universities and vocational institutes teaching forestry.

#### *Non-profit institutions*

- ▶ **Industry groups.** This includes the National Loggers Association (CORMA), the Wood Industrialists Union (ASIMAD), the Association of Board Producers (APT) and the Technical Cellulose and Paper Association (ATCP). Also included are the Association of Forestry Engineers, the Association of Woodworking Engineers, and the Association of Forestry Technicians.

- ▶ **Labor groups. The most important are:**
  - **The National Confederation of Forest Workers (CTF)**
  - **The Democratic Workers Union (CDT)**
  - **The United Workers Union (CUT)**
  - **The National Confederation of Unions of Agricultural, Forestry, Wood and Related Workers, of the Farm Workers Unit of Chile (UOC)**
  - **The National Confederation of Unions of Construction, Wood, Building Materials and Related Workers**
  - **The National Confederation of Unions and Federations of Industrial Workers in Wood, Cellulose, Paper, Paper Derivatives and Associated Services**
  - **The National Federation of Unions of Workers for the Paper and Board Manufacturing Company (CMPC) and similar firms**
  - **The National Federation of Unions of Forestry, Wood, Cellulose and Derivatives Workers**
  - **The Federation of CONAF Unions**
  
- ▶ **Nongovernmental organizations. These began to appear in the 1960s with the purpose of promoting or carrying out activities of an academic, scientific or social nature, and truly came into their own under the past administration. At present, many have ceased to operate because of the difficulties in obtaining financial resources. Most funds had come from international cooperation, which is now generally handled on a bilateral, government-to-government basis. In any case, they obtain funds by submitting projects to national or foreign organizations.**

Because they are so numerous and so diverse, they have come together to form the Association of Nongovernmental Organizations, ASONG, which is an umbrella organization for those that have been recognized as advisory groups by the United Nations and other international organizations. The National NGO Coordinating Group and the Colina Agreement represent those that are engaged in social action.

Another less specific type of NGO embraces forestry resources only as a component of programs pursuing more general objectives. They fall into two groups:

- Development and technology transfer centers, such as the Industrial Corporation for Regional Development of the Bio-Bio (CIDERE).
  - Rural development institutions, which are located throughout the country. Examples include the Agro-regional Studies Group (GEA), the Agrarian Research Group (GIA), the Social Development Corporation (JUNDEP), the Agrarian Promotion Institute (INPROA) and the Rural Education Institute (IER).
- ▶ **Environmental Organizations.** Groups under this heading are engaged in natural resource conservation, protection of flora and fauna, and control of environmental pollution. Some of them are:
- The Fauna and Flora Defense Committee (CODEFF)
  - The Environmental Research and Planning Center (CIPMA)
  - The Wildlife Society
  - The Chilean Ecological Institute

---

*Institutions with mixed public and private participation*

The main institution in this category is the Chile Foundation, a private-law corporation founded in 1976 by agreement between the government of Chile and the United States ITT Corporation. Its objective is to transfer technology for making better use of the country's natural resources and production capacity.

The category also includes schools of forestry engineering in the University of Chile (Santiago), the University of Talca, the University of Concepcion, Southern University (Valdivia) and technical institutes.



# **PRESENT STATUS OF RESEARCH ON POLICIES WITH AN IMPACT ON FORESTRY AND AGROFORESTRY SYSTEMS IN CENTRAL AMERICA**

Dean Current<sup>1</sup>

The purpose of this article is not to give a catalogue of all the research activity in Central America focusing on policies with an impact on the forestry sector and agroforestry systems. Instead, it will describe some of the experience and knowledge acquired during a socioeconomic and institutional study of agroforestry projects in the region, a study which also looked at the impact that policies have had on agroforestry (Current, Lutz, Scherr, in progress). It will explore the importance of policy research, recent policy changes that influence the forestry and agroforestry sector, research done in the past, institutions involved in policy research or studies, and several suggestions for future research. Discussion of policy research also covers instruments used for implementing policy (legislation, development programs, etc.), as well as policies that target other sectors, but have an impact on forestry and agroforestry.

## **BACKGROUND**

Only a few years ago, the forestry sector was still receiving very little attention in national development plans and sectoral programs. Forests were seen as a source of land to be converted to "productive" use. Even when forest policies and laws existed, they had no political support or resources for proper implementation; nor did any policies cover agroforestry. In recent years, however, interest in the forestry sector in Central America has been growing, and agroforestry is now included in new policies and in forestry and agricultural legislation (Appendix 1).

The new interest in forestry and in agroforestry systems can be attributed to a number of factors. Natural resources are severely degraded, and deforestation has advanced rapidly in the region. Thus, proper management of existing forests, reforestation, and the use of trees on farms now offer new opportunities to supply:

- ▶ **Forestry products needed by urban and rural populations.**

---

<sup>1</sup> Coordinator, CATIE/World Bank Agroforestry Project. Turrialba, Costa Rica.

- ▶ **Protection of sources of clean water for human consumption and for generating electricity.**
- ▶ **Soil protection and improved farm productivity through systems that protect the soil and help maintain and increase soil productivity with minimum use of fertilizers and agrochemicals.**
- ▶ **Protection of the environment and the services it offers (biodiversity, climate control, etc.).**

## **RECENT POLICY CHANGES AND THE NEED FOR RESEARCH**

**Research on the impact that policies often have on the forestry and agroforestry sector has become more important today, due to the greater interest in protecting the environment and the recognition of the role that forest and tree resources can play in protecting and improving the productivity of the natural resource base. Policies have changed in all the countries of the region as a direct result of this interest. Countries are not alone in rewriting policy; donors, international banks and NGOs have also changed their policies, which has had an impact on the forestry and agroforestry sector of the region. Changes that affect forestry and agroforestry include:**

- ▶ **Structural adjustment programs.**
- ▶ **Greater interest by international banks in the environmental impact of development projects.**
- ▶ **Greater interest by donors in promoting development projects for natural forest management, plantation tree cultivation, and agroforestry systems.**
- ▶ **Increased participation by NGOs in development programs, as the role of the state diminishes.**
- ▶ **Interest by governments in promoting "sustainable" development, in response to their own needs and to national and international pressures.**
- ▶ **New forestry policies and forestry incentive programs in the countries of the region (Appendix 1).**

These changes have come about over the past five to 10 years; they are reflected in government policies and can have either a positive or negative impact on the management and development of forestry and agroforestry. Research should be an important tool for evaluating the impact of policy shifts and for directing efforts to fine-tune or even change policies so they will meet their objectives more effectively, without detriment to the natural resource base.

## **RESEARCH TO EVALUATE THE IMPACT OF VARIOUS POLICIES ON THE FORESTRY SECTOR**

Studies have been done in Central America on forestry policies or forestry promotion mechanisms, as well as the influence that the policies of other sectors have on the forest sector. In general, however, very little formal research has taken place. Many studies have responded to specific needs and to the special interests of the various players in the field of forestry and agroforestry, rather than to a formal program of follow-up and evaluation to determine the positive or negative impact of policies so as to change them accordingly.

For example, forestry policy in Honduras is being studied by the National University graduate program in economics, a USAID project, the political parties, the National Association of Small Industry, and the Agricultural Sector Planning Unit as part of the Ministry of Natural Resources. Each one pursues its own interests (Vallejo, personal communication). According to Vallejo, with the exception of the National University graduate program in economics, which has developed research methodologies, policy studies are generally informal and superficial. Similar situations can probably be found in the other countries of the region as well.

A number of efforts are being made in the region to promote more in-depth studies that will identify the impact of new government policies on the forestry sector. The Inter-American Institute for Cooperation on Agriculture (IICA) is launching programs to orchestrate and complete studies and research on the forestry and agroforestry sector. In 1989, USAID, as part of its Regional Project on Natural Resource Management and the Environment (RENARM), began a program to document, analyze, discuss and monitor the environmental impact of policies. The Regional Coordinating Office for Economic and Social Research (CRIES) of the Central American University in Managua joined forces with the National Autonomous University of Costa Rica

to sponsor the preparation and publication of six case studies on the political economics of sustainable development in Central America. Three of the case studies addressed forest resources and structural adjustment programs in the region. CATIE's Project for Sustainable Development of Natural Areas (OLAFO) is working with other Central American and international researchers to prepare and apply methods for assessing the value of wetlands. These methods could provide a basis for policy development.

Some work has been done by universities and research and coordination centers in the region. Other studies have been funded by international donors and banks. They cover such issues as<sup>2</sup>:

- ▶ Forest incentives (TSC 1991)
- ▶ Impact of structural adjustment programs (Maldidier 1993)
- ▶ Impact of policies on deforestation
- ▶ Sustainable hillside farming (IICA 1991)
- ▶ Economic policies and sustainable development (Segura 1992)
- ▶ Legislation and deforestation (Vallejo 1992)
- ▶ Expansion of the agricultural frontier (CATIE-World Bank 1993)
- ▶ Impact of policies on agroforestry projects (Current, Lutz, Scherr, in progress)
- ▶ Value assessment of natural resources (WRI 1991)

A broader list of institutions involved in policies studies are shown in Appendix 2.

---

<sup>2</sup> References are to specific studies, or to compilations from workshops or seminars that included policy studies. In general, the research has been done by universities and other national and regional research centers.

## **FUTURE RESEARCH**

A quick overview of the status of research into policies that affect the forestry and agroforestry sector reveals little in-depth, coordinated research in the region. Recent efforts by the USAID Project RENARM and by the universities are encouraging, but efforts need to be better coordinated, and a research agenda needs to be set that responds to the most pressing needs for achieving sustainable development in the region. The organizations best suited and equipped to do research appear to be the universities, regional research centers, and environmental NGOs (WWF, IUCN, Neotropica Foundation). Funding will be needed from technical assistance agencies because of the budgetary constraints facing national governments.

This is why it is important to consider the various institutions and organizations involved in formal and informal policy studies, in order to understand the needs of each group, the impact that policies have on them, and conversely, the impact they can have on national policies. The fact that they are engaged in policy studies suggests that they are feeling the impact of these policies and can be an important factor in defining, implementing and disseminating research findings. They are also important sources of information and possible collaborators in research.

One of the most important areas of research will be follow-up and evaluation of the extent to which new policies and legislation played a role in changes that have already occurred. The purpose of this research would be to gauge whether policies are effective and efficient in meeting their objectives and to recommend changes, adjustments and new policies, so desired results can be achieved. The experiences of one country can be valuable for other countries of the region, and the coordination of efforts in Central America and Latin America is important for any research.

This research should be made available to decision-makers in a form that they can understand and put to use in the process of formulating and adjusting policies. This means that mechanisms should exist or be created for attaining access to the political system. Participation by decision-makers in formulating research plans can be a mechanism for holding their interest and, at the same time, for ensuring that research results will be suited to their intended purposes.

**REFERENCES**

- Current, D; Lutz, E; Scherr, S. In progress. Economic and institutional analysis of agroforestry projects in Central America and the Caribbean. The World Bank: Washington D.C.
- Gregersen, H; Oram, P; Spears, J. 1992, Priorities for forestry and agroforestry policy research: Report of an International Workshop. IFPRI: Washington D.C. 95 p.
- Inter-American Institute for Cooperation on Agriculture (IICA), ed. 1991. Agricultura sostenible en las laderas centroamericanas: oportunidades de colaboración interinstitucional. Proceedings from a workshop sponsored by the Swiss Development Cooperation Bureau, organized by the International Center for Tropical Agriculture, the Inter-American Institute for Cooperation on Agriculture, the Tropical Agriculture Research and Training Center, and the International Maize and Wheat Improvement Center. San Jose, Costa Rica. 518 p.
- Maldidier, C; Antillón, T. 1993. Deforestación y frontera agrícola en Nicaragua (photocopy). Presented in the Seminar on Political Economics of Sustainable Development in Central America: Six Case Studies, sponsored by the Regional Coordinating Office for Economic and Social Research (CRIES), 20-23 June 1993, La Catalina, Costa Rica. 33 p.
- Segura, Olman (comp.). 1992. Desarrollo sostenible y políticas económicas en América Latina. Colección Ecología Teología San José, Costa Rica. 311 p.
- Tropical Agriculture Research and Training Center (CATIE) / World Bank. In progress. Principal aspects of current deforestation in Costa Rica. The World Bank: Washington D.C.
- Tropical Science Center (TSC). 1991. Análisis de los incentivos y desincentivos forestales en Costa Rica. Prepared by the Neotropica Foundation, Environmental Studies and Policy Center. San Jose, Costa Rica. 65 p. app.

- United States Agency for International Development (USAID). 1992. *The green book: an environmental policy sourcebook*. Abt Associates and Agricultural Policy Analysis Project - Phase II. Washington D.C.
- Vallejo Larios, M. 1991. *Análisis de la legislación hondureña y su impacto global en la deforestación*. Tegucigalpa, Honduras.
- World Resources Institute (WRI). 1991. *Accounts overdue: natural resource depreciation in Costa Rica*. Tropical Science Center/ World Resources Institute: Washington, DC. 110 p.

## APPENDIX 1

### CHANGES IN POLICIES AND LEGISLATION FOR FORESTRY AND AGROFORESTRY SYSTEMS IN CENTRAL AMERICA

#### Costa Rica

- ▶ Incentive programs for small- and medium-scale farmers introduced in 1989, supplying 50 to 100 percent of the cost of planting and maintaining a timber plantation for five years.
- ▶ In 1993, agroforestry systems and natural forest management were included in the incentive program.

#### El Salvador

- ▶ CENTA, previously the National Agricultural Technology Center, was renamed the National Agricultural and Forestry Technology Center. Changes include using the extension system to promote the cultivation of trees by small- and medium-scale farmers (1992-93).
- ▶ Preparation and approval of a new Forestry Policy in which agroforestry plays a key role (February, 1993).

#### Guatemala

- ▶ New Forestry Law 1990

**Honduras**

- ▶ Law for Modernization and Development of the Agricultural Sector (1992). Changes the role of the Honduran Forestry Development Bureau (COHDEFOR), turning over to the private sector the responsibilities for management, extraction and marketing of the country's forests. COHDEFOR has moved into an advisory role. Also includes incentive programs for natural forest management and for establishing plantations.

**Nicaragua**

- ▶ In 1991, the Nicaraguan Natural Resources Institute (IRENA) resumed its former status as an autonomous institution focusing on sustainable management of natural resources.

**Panama**

- ▶ The Forestry Plan of Action is an integral part of the government's economic development plan.
- ▶ The forestry incentive plan was approved in 1992.
- ▶ A draft bill is pending to reform and strengthen forestry legislation.
- ▶ INRENARE has been strengthened since its founding in 1986.

**APPENDIX 2****LIST OF INSTITUTIONS INVOLVED IN STUDIES OF POLICIES AND THEIR IMPACT ON THE FORESTRY AND AGROFORESTRY SECTOR, BY COUNTRY<sup>3</sup>****Costa Rica**

- ▶ National University - Master's degree program in economic policy.

---

<sup>3</sup> This list is preliminary and incomplete. It does not include all the institutions or entities conducting studies on policies that have an impact on the forestry sector.



- 
- ▶ Tropical Science Center - consulting NGO.
  - ▶ Neotropica Foundation - Environmental Studies and Policy Center.
  - ▶ Tropical Agriculture Research and Training Center (CATIE) - regional.
  - ▶ Inter-American Institute for Cooperation on Agriculture (IICA) - regional.
  - ▶ Agricultural Policy Analysis Project (APAP) - USAID project.

#### **El Salvador<sup>4</sup>**

- ▶ Little forestry policy research is being done in El Salvador. A few studies have been funded by FAO to develop a forestry policy, and others have funding from USAID as part of the PROMESA project.
- ▶ Several university graduate theses have been written.
- ▶ Agricultural Policy Analysis Project (APAP) - USAID project.

#### **Guatemala**

- ▶ San Carlos University (Guatemala City).
- ▶ Agricultural Policy Analysis Project (APAP) - USAID project.

#### **Honduras<sup>5</sup>**

- ▶ Agricultural Sector Planning Unit (UPSA) of the Secretariat of Natural Resources.
- ▶ Agricultural Policy Analysis Project (APAP) - USAID project.

---

<sup>4</sup> Source: Modesto Juárez, Coordinator, Madeleña Project.

<sup>5</sup> Source: Mario Vallejo, consultant on forestry policy analysis.

- ▶ Graduate program in economics of the National University of Honduras (UNAH).
- ▶ Association of Forestry Professionals of Honduras (COLPROFORH).
- ▶ Political parties, with a specialized team to reorient policy if they obtain power.
- ▶ Federation of Agroforestry Cooperatives.
- ▶ Loggers Association of Honduras.
- ▶ National Association of Small-Scale Industrialists to guarantee the supply of raw materials.
- ▶ CEDOH - Honduran Documentation Center (private non-profit institution seeking funds to study the impact of the modernization law).
- ▶ School of forestry in process of being privatized.

### **Nicaragua**

- ▶ Agricultural Policy Analysis Project (APAP) - USAID project.
- ▶ Nitlapan project of the Central American University in Managua.
- ▶ Regional Coordinating Office for Economic and Social Research (CRIES).

### **Panama**

- ▶ Agricultural Policy Analysis Project (APAP) - USAID project.
- ▶ Panamanian Studies and Social Action Center (CEASPA).

## PRESENT STATE OF FORESTRY POLICY RESEARCH IN MEXICO

Hugo Alfredo Galletti<sup>1</sup>

The great bulk of Mexico's forested land, nearly 70 percent, is held in communal property arrangements known as "ejidos". Most of the rest consists of small-scale, privately owned forest properties. The amount of land in publicly-owned forests is negligible.

The history of forest land ownership systems in Mexico can be divided into several major stages. From pre-revolutionary times until the great farmland handouts at the end of the 1930s, the policy was to turn over large tracts under concession to private individuals, with the government playing almost no role in forest management. The agrarian reform in the early years of the revolution distributed only farmland, reserving forest lands as national property.

By the end of the 1930s, the foundations were in place for today's forest tenure system. Large swaths of forest land were placed in ejidos and community forests. Towns received land, forests, pastures and water, with the understanding that the forests were to be conserved for common use. During that period, the government attached overriding importance to forests, and in fact it was the only time when the forestry sector was represented on the President's cabinet, and a number of forest cooperatives were created. However, social relations in much of rural Mexico were primitive. Many of the cooperatives were little more than smokescreens for local fiefdoms or for speculative timber companies.

In 1945, as a consequence of general political shift, the classic Mexican forestry model came into existence. The nation still had large tracts of undistributed forest land. The government promoted a double-pronged system by which large extensions of public land were given out in concession, while at the same time, a policy of "forced persuasion" brought ejidos and community forests into the concession system. These large forested units were associated with factories that had a monopoly hold on their entire regions. A special legal entity was created to facilitate this practice: the Industrial Forest Development Unit (UIEF). In principle, these UIEFs were private, but during the 1950s, most of them took on a para-state character. The culmination

---

<sup>1</sup> Expert with the México-Germany agreement, Forestry Pilot Plan for Quintana Roo. México.

Unit (UIEF). In principle, these UIEFs were private, but during the 1950s, most of them took on a para-state character. The culmination of this policy was the creation of administrative support bodies. Thus, the forest service acquired autonomy concerning social conditions and land tenure, and devoted itself almost entirely to enforcement. To a great extent, it has retained this role to the present.

The 1960s and 1970s saw a second great handout of forest land, this time involving tropical land and marginal areas, followed by migratory flows to settle the tropics. Unlike the previous land distribution, it made no allowance for forest conservation. The stated purpose of these policies was to "expand the agricultural frontier" based on sweeping plans written by technocrats. The result was the destruction of vast areas of forest. During this period, the forestry sector had dwindled to a marginal role, merely a holdover from the earlier stage of concessions.

At the beginning of the 1980s, two facts had become very clear. First, the dynamics of the destruction of resources had gathered uncontrollable momentum. Second, one of the most powerful triggers of this destruction was the policy of barring local populations from the forestry business. The country's social and economic conditions had changed so much over the past fifty years that the old models were no longer useful. Moreover, the world at large had gained a new understanding of environmental limits on economic growth, calling for changes in land-use policies. Thus began a new concept of making landowners responsible for properly administering forest resources, while maintaining a centralized, bureaucratic approach to forest administration.

The story of how forestry policies changed and evolved mirrors the story of power relations between forest owners, intermediaries, industrialists and the state. Unlike the situation in countries with a more developed forestry sector, Mexico's government did not set up publicly-held forest lands, but instead sought control over private owners in the administration of their forests. Owners were placed under severe restrictions on the use of forest land, and for decades, law-enforcement methods were the tool of choice.

The most recent changes in agrarian and forest laws are based on the idea that owners of the resources should bear greater responsibility. The emphasis shifts away from the official forest service, focusing instead on the creation of private offices for the

administration of private forests. However, there is no true government forestry extension service, despite long-standing pleas by owners of small- and medium-sized forests.

The forest service has long preferred centralized methods on a scale which is too large to be functional; there is so little technical staff that the official forest service cannot in reality administer woodlands. Because the forest service is too big to be functional and relies heavily on police action, it became an obstacle to the emergence of new approaches to forest management that could operate at a lower level and be regional and more autonomous. It continues to be difficult to organize and fund management programs for private forests, or to find economic opportunities for more transparent marketing of forest products, because of fundamental difficulties with the sustainability of a regional-level forest economy.

An understanding of this historical process reveals to a great extent why Mexico's public sector has not engaged in any true forestry policy research. For the most part, the adoption of forestry policies has been driven by circumstances. Instead of true research into forestry policies, the only tool has been a minimum pool of data for decision-making. A functional, believable data base would be needed if the country were to move beyond this improvised form of decision-making, which in general has been shaded by ideological considerations. General historical studies are needed, to examine both technical and socioeconomic factors. There is also a lack of case studies or comparative studies, especially on policies for natural forests and tropical forests.

Basic supporting studies for forestry policies generally consisted of little more than simple consultancies by government advisory services, or private business studies. Most of the latter focused on financial aspects of industrial processing and evaluated alternative sources of supply. There is barely any thought for sustainability in forest management, which is intimately linked to relationships between forest land and regional industrial facilities, as forest industries in Mexico generally do not own forests. University research has developed only through the efforts of isolated researchers, mostly emphasizing historical trends. There are no specialized institutes studying forestry policy.

The state of Quintana Roo presents a somewhat different case. While it has seen no systematic research into forestry policies, over the

past decade efforts have been made to integrate the various factors of production with the relevant social sectors. During this period, nearly all the productive forests in the state were surveyed, and a management system began to develop. Forestry technicians and owners combined forces by forming associations of forestry producers. Together they have participated in drafting forestry policies for the region. Interaction with the state government has been constant, and policies have been very stable, lasting nearly a decade to date.

Forest owners in Quintana Roo are the state government's points of contact in society for matters of forestry policy. As a result, the state has managed to bypass the typical situation of sectoral fragmentation, at least in part. This is true both inside the forestry sector, where forest management, marketing and industrial infrastructure traditionally operated in total separation from one another, and in terms of soil use policies. Systematic efforts have been made to fit the general outlines of forestry policy to the requirements of practical application. Decision-making is being placed more and more in the hands of the forest communities themselves, and a more workable data base is being generated.

In other parts of the country, similar social foundations have been built, although to varying degrees. Organizations of forest land owners began to present a common front, defending their rights to administer their resources independently, and some of their positions were incorporated into the new agrarian and forest laws. This year, the various groupings of forest owners have organized themselves to take on the issue of rational use of their forest lands. They have created a non-profit federation, the National Union of Organizations of Communal Forestry, one of whose objectives is to make sure that woodland owners are better represented when decisions are made on forestry policy.

This amalgamation of associations of forest owners is not currently conducting systematic research on forestry policy; however, it provides a stable social foundation for advocating such research. Because it basically has fixed capital stock (the value of its forest lands), it is interested above all in conserving its forests as a long-term economic resource. Its work may also provide a means to do away with forest speculation and abstract environmentalism. In our understanding, these are ideal springboards for developing joint research projects with public or private groups, in which matters of

forestry policy can be analyzed on the basis of a data base specific enough to be very practical, functional and rooted in reality.

**ADDRESSES OF POSSIBLE CONTACTS FOR FORESTRY POLICY RESEARCH IN MEXICO**

**National Union of Organizations of Communal Forestry, A.C.**

Southeast coordinating office:

Sociedad de Productores Forestales Ejidales de Quintana Roo  
Mateo Poot Canché, President  
Alfonso Argüelles Suárez, Technical Forestry Director  
Carmen Ochoa de Merino esq. Hidalgo  
Tel. (983) 25232  
Fax (983) 29802  
Chetumal, Quintana Roo

Southern coordinating office:

Unión de Ejidos y Comunidades Forestales de Oaxaca (UCEFO)  
Pedro López, President  
Elfrego Chávez, Technical Forestry Director  
Oaxaca, Oax.  
Tel. (951) 60126,

Northern coordinating office:

Unión de Ejidos Forestales Emiliano Zapata  
Roberto Vidaña, President  
Fernando Arenas, Advisor  
Tel. (186) 20660  
Santiago Papasquiario, Durango

Western coordinating office:

San Juan Nuevo Parangaricutiro Indigenous Community  
Nicolás Aguilar, Manager  
Ambrosio Saucedo, Technical Forestry Director  
Tel. (459) 40051/40056  
San Juan Nuevo Parangaricutiro, Michoacán

**Mexico-Germany Agreement (local office in Quintana Roo)  
Quintana Roo Forest Pilot Plan  
Hugo Alfredo Galletti  
Henning Flachsenberg  
René Forster  
Hidroeléctrica del Infiernillo No. 157, esq. Efraín Aguilar  
Tel./fax (983) 24424  
Chetumal, Quintana Roo**

**Prof. Jorge Torres  
Dr. Jürgen Queitsch  
Doctorado en Economía Agrícola  
Universidad Autónoma de Chapingo  
Estado de México**

**M.C. Cuauhtémoc González Pacheco  
Instituto de Investigaciones Económicas  
Universidad Nacional Autónoma de México  
México, D.F.**

**Dr. Jan de Vos  
CIES  
Carretera Panamericana y Periférico  
San Cristóbal de Las Casas, Chiapas**



# **AGROFORESTRY AND FOREST RESEARCH POLICIES IN JAMAICA**

Roy S. Jones<sup>1</sup>

The social and economic development of Jamaica depends largely on the acceptance, application and implementation of an appropriate research and development policy. The Government of Jamaica recognizing the importance of a research and development policy, together with the wider cardinal role of Science and Technology in the strategies for economic and social development of the nation, is now committed to the formulation, and implementation of such a national policy for medium and long term development.

## **NATIONAL POLICY AIMS AND OBJECTIVES**

The broad objective of the Government is to increase the role of Science and Technology (Research and Development) in the attainment of economic and social improvement and development, through a social transformation, removing injustice in the society, and improving the quality of national life.

## **SPECIFIC AIMS**

The aims of this policy are to:

1. Foster, promote and sustain the development and the coordination of science and technology relevant to the needs and circumstances of the country.
2. Establish within the country conditions, and the necessary climate which will ensure scientific creativity and innovation and allow the talents of man and woman to find full scope in scientific activity.
3. Assess, develop and manage, as appropriate, the nations natural resources.

---

<sup>1</sup> Director, Forestry and Soil Conservation Department, Ministry of Agriculture, Kingston, Jamaica

3. **Assess, develop and manage, as appropriate, the nations natural resources.**
4. **Utilize the results of worldwide research and development to strengthen productive sectors such as agriculture, industry and manufacturing.**
5. **Ensure that scientific and technological development improve the welfare of citizens.**
6. **Protect the environment and improve the quality of the habitat.**
7. **Increase the nation's competitiveness in trade.**
8. **Enhance the cultural, social and economic development of the country and contribute to programs of self-reliance.**
9. **Support the integration of Science and Technology in economic planning.**

These objectives will be achieved in Jamaica by using Science and Technology (Research and Development) to generate resources; to compensate for the deficiency of raw materials; to better exploit resources; to reduce waste; to improve traditional methods and skills in the country; and to increase efficiency and productivity in the fields of agriculture, industry, services and other areas.

## **FOREST POLICY**

The long term Forest Policy of the protection and development of the Forest Estate, afforestation of suitable areas, the encouragement of private forestry and research on silvicultural and utilization problems remain unchanged. Recent work has been done and is being done to review and update the Forest Policy to address the societal changes that have taken place. The relevant proposed policy statement on agroforestry and forestry research is:

**"In relation to forestry plantation and development the Government is responsible to manage and sustain a comprehensive forestry research program to provide a sound technical base for forest management and development, and in**

particular identify silvicultural data directed towards improving the financial yields of species important to the national economy."

The term species, here, refer to not only timber species but include fruit trees, shade trees and fast growing species for fuelwood and charcoal.

### **OBJECTIVES OF FOREST RESEARCH POLICY**

The objectives of the Forest Research Policy being implemented fit within the National Forest Policy, which falls within the overall framework of the National Policy of Science and Technology and are listed as follows:

1. To develop and improve the technical bases for forestry development in Jamaica.
2. To assist in the conservation of natural forest resources.
3. To improve efficiency and reduce costs of forestry operations.
4. To provide rationale for silvicultural practices.
5. To improve knowledge of growth and yield of main crop species, for use in forecasting, and planning harvesting operations.
6. Improve genetic strains of existing species.

### **CONSTRAINTS TO SUCCESSFUL POLICY IMPLEMENTATION**

The major constraints identified are the lack of sufficient financial resources, equipment, and trained personnel, coupled with the inability to retain trained personnel.

### **SOME ACHIEVEMENTS**

Some successful agroforestry and forestry research achievements can be listed as follows:

1. Growing of *Pinus caribaea* seeding without shade in the nurseries.
2. Identification and determination of fast growing species suitable for different local sites.
3. Identification and determination of the productivity of those fast growing species suitable for fuelwood and charcoal.
4. Production of live yamsticks in Yam Growing Areas in the Central Part of Jamaica.

## **CONCLUSION**

The present Forest Policy is now being revised as a component of the CIDA/GOJ Trees for Tomorrow Project. This revision must clearly state the Research Policy on Forestry and Agroforestry, likewise the revised Forestry Act. It is quite clear that Government's continued support to implement both the New Policy and Act is paramount, also to provide for the retention of trained, qualified professional staff.

## **APPENDIX 1**

### **INSTITUTIONS WORKING IN COLLABORATION WITH THE DEPARTMENT ON AGROFORESTRY AND FOREST RESEARCH**

1. FAO of the United Nations Development Program (FAO/UNDP)
2. USAID/GOJ Hillside Agriculture Project (HAP)
3. Rural Agricultural Development Authority (RADA)
4. Natural Resource Conservation Authority (NRCA)
5. Ministry of Mining and Energy -Energy Division- (MME)
6. University of the West Indies -Botany Department- (UWI) Conservation Data Centre (C.D.C.)
7. Cambridge University -Botany Department, Darwin College

- 
8. **United Kingdom Overseas Development Administration (UK/ODA)**
  9. **Tropical Development and Research Institute (TDRI)**
  10. **Oxford University/Oxford Forestry Institute (OFI)**
  11. **Organization of American States (OAS)**
  12. **Institute of Tropical Forestry -Puerto Rico- (ITF)**
  13. **Research Department -Ministry of Agriculture (R/D/MINAG)**
  14. **School of Agricultural & Forest Sciences, University of Wales, Bangor**

**REFERENCES**

1. **Forestry and Soil Conservation Department. 1991. Progress Report - Forestry in Jamaica. Jamaica.**
2. **Ministry of Development, Planning and Production. 1990. Science and Technology National Policy. Jamaica.**

## HONDURAN INSTITUTIONS

Paul J. Martins<sup>1</sup>

The Broadleaf Forest Development Project (PDBL) in northern Honduras is a bilateral project funded mostly by the government of Canada through the Canadian International Development Agency (CIDA) and its Canada-Honduras Forest Program. Its main objective is to slow the decline of broadleaf forests by encouraging the use of agroforestry and forestry techniques that will help increase production and improve the quality of life and standards of living for rural families.

The Honduran Forestry Development Bureau (COHDEFOR) is the main institution working with PDBL, and a secondary objective of the project is to provide COHDEFOR with institutional support. The Secretariat of Natural Resource (SRN) and the National Agrarian Institute (INA) are also involved, although to date only the SRN has contributed to project implementation.

COHDEFOR is the only institution in Honduras authorized to set forestry and agroforestry policies. The Bureau underwent massive restructuring in early 1993, and has not yet clearly settled its operating procedures. Thus, it will be a long time before the institution produces a forestry policy and takes effective control of the situation.

Unfortunately, nearly all policies established by COHDEFOR so far have focused primarily, and almost exclusively, on pine forests, which occupy a major position in the national economy. By contrast, COHDEFOR's expectation has been for PDBL, as a pilot project, to design and test forestry and agroforestry policies for the broadleaf forest. Although this has in fact happened, COHDEFOR itself has hesitated to make decisions. As of March 1993, no position had yet been taken on a PDBL policy proposal for the broadleaf forest, due to apathy, lack of support and inappropriate policies. Politics continue to play a major role, in both the institution and its staffing. Many of the decisions needed for improving forests, the environment and the socioeconomic setting are politically difficult. Few want the present situation to change, even though certain policies supporting such decisions are already on the books.

In fact, the PDBL is the only project or institution in Honduras with practical experience in the broadleaf forest. Therefore,

---

<sup>1</sup> Consultant, Canada.

COHDEFOR recently invited the PDBL to rewrite its "Guide for preparing management plans," turning it into a government document that will set forth the nation's rules and regulations for preparing, implementing and following up on management plans for the Honduran broadleaf forest.

Until around two years ago, CIDA maintained a "Forestry Program Support Unit" with a high-level forestry advisor in Tegucigalpa. The office had certain influence on forestry policy and spared no effort to prepare a draft bill of incentives for reforestation and forest management, which by early 1993 had not yet been submitted for approval by the national legislature.

AID and other international organizations involved in structural adjustments of the Honduran economy play a very important role in the country's forest policies, but they focus almost exclusively on pine forests. Our experience with the PDBL very clearly shows that the broadleaf forest needs specific attention with its own policies and rules. Other Honduran institutions that could play a role in forestry and agroforestry policies include:

▶ **El Zamorano Pan American Agricultural College**

The mission of this college has traditionally been to train agronomists. However, it is now developing a specialization in natural resource management, to include forestry and agroforestry activities. This interest is a good indication of the growing awareness of how important it is to make better, more integrated use of the land by combining agricultural activities with forestry and agroforestry.

▶ **Regional University Center of the Atlantic Coast (CURLA), La Ceiba**

Although CURLA is the home of the country's Forestry Engineering Program, it conducts almost no research on the broadleaf forest. It is ideally located at the heart of the broadleaf region, and has 2000 hectares of virgin broadleaf forest bordering its campus. The faculty receive little support from the university, nor is there funding for needed research. Although the university is sometimes very political and subject to frequent

strikes, the PDBL has received much cooperation, particularly from agricultural professionals, in implementing the PDBL "Germplasm Bank," located on land donated by CURLA. This bank supplies plant material for the project's agroforestry component, as well as a great variety of exotic fruits, green manure, multi-use trees, etc. Plans also call for establishing plantations of forest species endangered in Honduras, and the CURLA department of forestry is expected to support this activity. The department may also be able to help develop forestry and agroforestry policies, as could the professionals and technicians from ESNACIFOR.

- ▶ National School of Forestry Sciences (ESNACIFOR), Siguatepeque

This school, located in the pine forest, produces the country's forestry professionals. ESNACIFOR could contribute its practical experience with pine forests.

- ▶ Associations of Forestry Professionals (COLPROFOR and ASNACIFOR)

Unfortunately, the country's forestry professionals and engineers spend a great deal of time arguing with one another over who is most qualified to manage forest resources. If the forestry specialists of Honduras could get together in a single organization, they would have enough political clout to keep the government on track; divided, they have no voice. The members of both organizations can contribute to the development of forestry and agroforestry policies for Honduras.

- ▶ Honduran Environmental Association (AHE) and the Cuero y Sal Wildlife Foundation (FUCSA), La Ceiba

A growing variety of nongovernmental organizations such as AHE and FUCSA are



involved in the management of protected areas. For example, FUCSA has built a political profile and has raised enough funding for its activities. It recently took part with other organizations in drafting a discussion document entitled "National Policy for Sustainable Ecotourism in Protected Areas of Honduras."

# STATE OF THE ART IN FORESTRY AND AGROFORESTRY POLICY IN URUGUAY

Carlos Seré<sup>1</sup>

## THE FOREST SECTOR IN URUGUAY

Uruguay has approximately 16 million hectares of agricultural land, used primarily for raising cattle and sheep on native pastures. The country's natural vegetation consists of open grasslands, with native gallery forests along the river banks and approximately 400,000 hectares of highland forests. Forest plantations mostly consist of small spreads of eucalyptus planted for protection and as a source of wood for agricultural operations, as well as pine plantations mostly along the Atlantic coastal belt (approximately 150,000 ha of forested land).

## FOREST DEVELOPMENT STRATEGY

For over 20 years, it has been recognized that Uruguay has major forest potential. Agro-climatic conditions are ideal for eucalyptus and pine, and there is little pressure for land. Plantations can be established at minimal cost, as no pre-existing scrub or tree vegetation needs to be removed, and transportation and port infrastructure is already available.

In the past, some 2,500 hectares of forest plantations were established every year in the whole country. In recent years, this trend has changed radically. International markets for wood and cellulose, coupled with promotional policies by the national government, created a climate very favorable for forest planting. From 1975 to 1988, an average of 2,500 hectares was planted every year; the figure rose to 5000 hectares in 1989, 9,000 in 1990, 14,000 in 1991 and 26,000 in 1992. The government has set a goal for planting 200,000 hectares of forest by the year 2000.

Uruguay, with no sources of fossil fuel, maintains a policy of relatively high prices for this critical input. As a result, Uruguayan industry has undergone a major transformation toward the use of fuelwood as an energy source. However, the forest strategy casts exports as the principal market for wood and cellulose.

---

<sup>1</sup> Independent consultant, Uruguay.

## **THE PRESENT POLICY FRAMEWORK**

The country's policy framework is similar to that of Chile, Argentina and Brazil. Forest planting is encouraged on certain land deemed to hold "forest priority". The main policy tools are:

- a) **Planting subsidies are available (from US\$40 to US\$100 per hectare planted, based on a fixed-cost percentage set by the government).**
- b) **Exemptions are given from taxes such as import tariffs on inputs, equipment and vehicles for agricultural, industrial or agroindustrial companies engaged in forest planting, national and departmental taxes on rural real estate, and taxes on income derived from forestation.**
- c) **Facilities are available for corporations to appear as holders of the land when they are using it for forestation; forests are considered chattel, and thus can be used as collateral for loans, independently of the land.**
- d) **Credit can be obtained to finance up to 80 percent of investments in forestation projects, forest nurseries, forest service companies or forest industries, excluding the purchase of land; terms are 12 to 15 years for paying principal and interest, at LIBOR interest rates of 180 days plus 1.5 points, with collateral required.**

While the policy promotes forest planting, it protects native woodlands. Regulations cover all movement and trade in this wood, except for its use on agricultural lands themselves. Agroforestry is a very new field in Uruguay, and the first research work is just beginning. At present, there are no specific agroforestry production policies.

## **PARTICIPANTS IN POLICY RESEARCH FOR THE SECTOR**

The Forestry Department, which is part of the Ministry of Livestock, Agriculture and Fishing, is responsible for implementing the country's forestry policies. It has commissioned consultants, both Uruguayan and foreign, connected with such organizations as the OAS, the World Bank, the Japanese International Cooperation Agency (JICA)

and the like, to carry out projects on forestry policies. The institution has one staff economist.

Current policies are being designed on the basis of existing forestry laws; other than this, very little research on forestry policy is taking place in the country. Under a new forestry project with World Bank funding, the Forestry Department is expected to contract and carry out certain research projects. One example, a research agreement between the Forestry Department, the National Agricultural Research Institute (INIA) and the JICA, emphasizes research in genetic improvement of forest species.

The Inter-Disciplinary Center for Development Studies/Uruguay (CIEDUR), a nongovernmental organization, has developed a research project entitled "Forestry Development and Environment in Uruguay." This project provides a framework for analysis of a full range of issues in forestry policy. Other nongovernmental organizations are also involved in activities to publicize and promote the role of trees in the environment. However, these institutions are not known to be addressing forestry policy research.

Priorities for forestry policy research in Uruguay differ significantly from those of the region's tropical countries, whose great masses of tropical forests are rapidly being occupied and deforested. Uruguay's native forest is under very limited pressure, and ownership rights are very clear on most of these forests. Therefore, forest planting policies are the center of attention, and the following issues hold top priority:

- ▶ The role of forest planting as a source of energy. The case of Uruguay could be instructive for other countries with no fossil energy reserves, but with land resources suited to a forest strategy. This experience stands in contrast to social forestry programs in many developing countries, where energy problems are being solved at the micro level.
- ▶ Long-term sustainability of forestry systems based on eucalyptus monoculture; the socioeconomic and environmental impact of the agroindustrial complex.
- ▶ Institutional development of the forestry sector, coordination of the public and private sectors, bargaining power for the

different parties involved, organizing those involved in the process.

- ▶ **International competitiveness of the Uruguayan forestry sector, policies for public investment in infrastructure, training of human resources, etc., for developing this newly emerging sector.**

## **INSTITUTIONS WORKING IN FORESTRY POLICY**

**Ministry of Livestock, Agriculture and Fishing  
Forestry Department  
18 de Julio 1455  
11200 Montevideo Uruguay  
Tel: (598 2) 419707  
Fax: (598 2) 419706  
Director: Atilio Ligrone**

**Interdisciplinary Center on Development Studies, Uruguay  
CIEDUR  
Joaquín Requena 1375  
11200 Montevideo Uruguay  
Tel: (598 2) 484674  
Fax: (598 2) 480908  
Director: Carlos Pérez Arrarte**

# FORESTRY RESEARCH IN THE DOMINICAN REPUBLIC

Manuel Serrano<sup>1</sup>

## LEGAL FRAMEWORK

Without a doubt, the weakest link in forestry policy in the Dominican Republic is research. Law 5856, enacted in 1962, governs all forestry activity in the country. Chapter III of this law emphasizes the need for forestry research, but sets no mechanism for such research to take place. In another section, the law created the General Department of Forests, which holds most responsibility for managing and protecting the country's forest lands.

Law 258 was enacted in 1984. Chapter VI states, "A forestry research section should be established in the General Department of Forests, to provide technical information not presently available concerning forestry activities in the Dominican Republic". The law also specifies what items should be included in a research program, as follows:

1. Species trials for reforestation, including seed provenance tests. These studies should include both native and exotic species.
2. Growth and yield studies of native forest tree species and the most commonly planted exotic species.
3. Silviculture systems for natural reproduction of the most important species and forest types in the Dominican Republic.
4. Soil and site assessments for the major forest species.
5. Feasibility studies for skidding logs by cable on slopes with a grade over 30 percent.

Although these areas were defined as urgent, the General Department of Forests has yet to take a single initiative toward carrying out the stipulations of the law. This failure by the General Department of Forests to develop a research program can be attributed to a number of factors:

---

<sup>1</sup> Office of Forestry Research, National Botanical Garden. Santo Domingo, Dominican Republic.

- ▶ Lack of institutional development.
- ▶ Lack of resources (nearly the entire budget is needed for personnel).
- ▶ As of 1968, the General Department of Forests passed into the hands of the armed forces, and became essentially a law-enforcement institution.

### CONTRIBUTIONS BY NGOs

Several organizations have conducted limited research in forestry and agroforestry. For over ten years, the Advanced Institute of Agriculture has been studying the dry forest. Its work has mostly focused on charcoal yield, basic density, ability for natural recovery, and the like.

The GTZ has studied dry forest management in the southwestern part of the country. The Sierra Plan in the central range has included studies of conifer forest management, especially with *Pinus occidentalis*. Experiments in the Caribbean have focused on the growth characteristics of native and exotic moist-forest species. Studies have covered a number of species of the *acacia* genus, *Cordia alliodora*, *Terminalia ivorensis*, *Grevillea robusta*, the *casuarina* genus, *Simarouba glauca*, and various multi-purpose species.

A USAID study for the Dominican Agribusiness Board was entitled "Inventory of Natural Resource Policies in the Dominican Republic." It recommends four areas for future research:

- ▶ Adaptability research (provenance studies) for exotic species being introduced, before they are planted on a large scale in the country.
- ▶ Basic research on species behavior.
- ▶ Determination of appropriate areas for each type of forest, depending on capacity.
- ▶ Possibilities for rehabilitating forests on degraded soils, deforested areas, and sites severely altered by over-exploitation.

## **AGROFORESTRY RESEARCH**

For five years, ENDA-Caribbean has been running a participatory research program in agroforestry, which developed profiles of the different farming systems in use in the Dominican Republic. Others have been introduced as well, and techniques have been developed to improve existing agroforestry systems. A new research project was recently designed to study the economic feasibility of agroforestry, as well as certain aspects of the crop/tree relationship.

Other institutions working in agroforestry research are: the Sierra Plan, the San Jose de Ocoa Development Association, the Cibao Environmental Society, and the Loma Quita Espuela Foundation.

## **INSTITUTIONS INVOLVED IN FORESTRY AND AGROFORESTRY ACTIVITIES IN THE DOMINICAN REPUBLIC**

### **Government Institutions**

- ▶ General Department of Forests (DGF)
- ▶ National Parks Department (DNP)
- ▶ National Technical Forestry Commission (CONATEF)
- ▶ Secretariat of State for Agriculture (SEA)
- ▶ National Institute of Water Resources (INDRHI)

### **NGOs**

- ▶ ENDA-Caribbean
- ▶ Advanced Institute of Agriculture
- ▶ Floresta
- ▶ Los Arbolitos
- ▶ San Jose de Ocoa Development Association



- ▶ **Cibao Environmental Society (SOECI)**
- ▶ **Loma Quita Espuela Foundation**
- ▶ **Progressio Foundation**
- ▶ **Community Development Foundation (FUDECO)**
- ▶ **Cordillera Plan**

# MANAGEMENT AND CONSERVATION OF DENSE TROPICAL FORESTS IN THE AMERICAN TROPICS

Jean-Marc Dubois<sup>1</sup>

The following text is based primarily on the synthesis prepared by CIRAD-Forestry as part of FAO-Forestry Study No. 101. This study was completed in early 1992, and contains a synthesis of the documents compiled by the Forestry Department of FAO, such as national reports (e.g., the one on Central America prepared by Hector A. Martinez and Ronnie de Camino) and project reports or summaries prepared by different experts and consultants.

Since that time, several important events have occurred, such as the creation of CIFOR and the reorientation of activities carried out by entities associated with the CGIAR, which will have to evaluate the problems related to the long-term management of forestry resources.

## A BRIEF OVERVIEW OF THE RESEARCH CONDUCTED

In many countries, research carried out to learn how forestry ecosystems function and how they are affected by human intervention or forestry activities is still rudimentary and not well coordinated.

In Central America, tests conducted by CATIE, in Costa Rica, in secondary forests have led to the establishment of two management systems: one that leads to clear-cutting after fifty years (with two intermediate cuttings) and another system that permits partial development with rotations every 20 years, and thinning to eliminate secondary species. Other countries in the region have tried to implement similar practices, but many times have not provided the necessary follow-up. However, in Puerto Rico, certain forestry practices have been applied to secondary forests, making it possible to evaluate the growing stock of dominant species.

The following two orientations were used to conduct the study on the possible restoration of dense forests in the Amazon region and in Guyana, used for forestry development:

---

<sup>1</sup> Director of the Forestry Department, CIRAD, France.

- a) **The regeneration of the understory, with the partial or total opening of the canopy and forestry interventions that benefit valuable species.**
- b) **Allowing the growth of the medium, large or small trees of the upper story, using different degrees of thinning of the upper part to eliminate unusable secondary species.**

In attempts at regeneration, clear-cutting of alternate rows within the forest, or the partial opening of the canopy, provided partial results: the effectiveness and usefulness of the interventions have not been clearly demonstrated.

Practices that took into consideration the intensity of farming, with or without maintenance thinnings, were used particularly in Suriname, Brazil and French Guyana.

In Suriname, the CELOS program made it possible to implement a polycyclical system over a period of 20 years, with partial exploitation and three successive thinnings to eliminate secondary species. Assays were also carried out to define an exploitation system that could be used to control damages.

In Brazil, the TAPAJOS tests, for example, confirmed the favorable reaction of the trees to opening up the forest population, at least with regard to an increase in diameter.

Recent INPA tests in Manaus and PARACOU tests in French Guyana are beginning to produce the first quantifiable results, which are consistent with previous tests.

The knowledge accumulated in several regions is a valuable source of forestry information. To undertake a meticulous, critical study that summarizes all the knowledge acquired at the experimental level is a considerable task, but one that should be a part of the new perspectives. This will make it possible to consolidate forestry development projects and avoid the repetition of useless, costly operations that are often doomed to failure.

## MANAGEMENT PRACTICES

In spite of the research and development activities carried out in the region, forestry management is only a concept in most of the countries of Latin America and is not put into practice, in spite of the fact that in most legislation there is a requirement that a forestry management plan be submitted before an exploitation permit can be granted.

This can be attributed to several things: the lack of management training among forestry agents; unfamiliarity, in general, with tested management techniques; and a lack of interest on the part of forestry enterprises in long-term forestry management, which is not as profitable as short-term intensive exploitation.

In Suriname, forestry norms for sustainable management have been clearly established (CELOS System) and, although they have not been implemented, they should serve as an example for the other countries.

In Brazil, no forests are being exploited on the basis of a large-scale management plan. Nevertheless, forestry and management research has identified problems that could arise during implementation of such management plans. Sustainable exploitation seems possible, but it is very difficult to interest loggers in this type of management.

In Bolivia, attempts at large-scale forest management have been affected by the lack of research findings and interest on the part of loggers to fund this system.

In Mexico, of particular interest are the initiatives taken by the farming community to set up associations *ejidos* which manage the resources of their own forests. The Quintana Roo pilot forestry plan is the most significant example, but it remains to be seen whether or not the plan will survive.

Lastly, while the example of Trinidad, which is currently managing its forests, is an exception, it proves that forestry management is possible.

Everything seems to indicate that numerous scenarios have been tested (successfully or unsuccessfully), and that implementation

of forestry management (public or private) depends, to a great extent, on the national and international will to do so.

## **PROPOSAL FOR ORIENTING RESEARCH**

Tropical areas in the Americas, as a whole, are facing problems caused by deforestation, due basically to demographic growth in the countries of the Isthmus, in the mountainous areas of the Andean region or in northeastern Brazil, around the Amazon jungle.

Given this challenge, the previous examples would seem to indicate that existing legislation for protection and the corresponding administrative structures are totally ineffective in this area.

Different research policies are possible, depending on the population density:

- a) The countries of the Isthmus are all heavily populated, which is linked to the lack of energy resources and timber-yielding forests. Land, as a factor of production, is becoming scarce and the effects of erosion could become even very important. Within this context, there is an urgent need to establish policies that identify protected forests, which must be accompanied by intensive management of production forests and incentives for agroforestry activities.
- b) In the mountainous regions of the Amazon, forest areas, which are in fact land reserves, are not densely populated. Scientific-based land zoning makes it possible to orient agricultural land settlement towards more fertile lands, to develop forestry exploitation in permanent forests, and to preserve zones of key importance in terms of ecology and biodiversity. In Guyana, which is sparsely populated, clearing for agricultural activities does not present a problem. Consequently, forestry management appears to be essentially a technical problem, and the legislation of French Guyana and Suriname are adapted to this.

The dichotomy of population density appears again in silviculture and management options, at the level of the forest economy and in attractive research activities.

In densely populated countries, there is strong pressure on the land and to use forests. Consequently, intensive silviculture and forestry management techniques must be applied.

On the other hand, when population density declines, only extensive techniques are applied and the use of the forest is left for the forestry engineers, as the principal forestry activity in such zones.

In the medium term, the countries of the Isthmus will have problems in supplying timber. It is necessary, therefore, to exploit existing forests in the best possible way in order to reduce the cost of forestry products. One example would be to extend the exploitation period throughout the year. This would make it possible to develop small industries and woodcrafts, increase the profitability of forestry production and better protect the forest and ecosystems.

In a broader sense, the countries of the Amazon, where large areas of forest are still found, should ask themselves if they are interested in maintaining, or even developing, traditional forestry activities in the tropics, in which exportation is possible only in certain cases. It is important, nevertheless, to control exploitation and provide the necessary modern tools (teledetection and radar) at the national and regional levels. It is necessary to improve techniques and increase profit margins for businesses, a part of which should be contributed to an autonomous national budget for reinvestment in the forest.

When the area is densely populated, forestry research should focus on studying intensive silviculture and the regeneration of the natural forest. In fact, the demand for wood products makes it necessary to intervene heavily in the forest population. Moreover, the necessary labor force is available.

Also, in countries that are not too densely populated, forestry research should focus more on inventory and control techniques, on the impact of the exploitation and the thinnings on the plantations, and on a study of forestry uses and products. This research should be conducted in conjunction with agricultural services in an effort to ensure that an increase in the human population does not lead to a degree of environmental degradation that may be irreversible.

# THE SITUATION OF RESEARCH ON FORESTRY AND AGROFORESTRY POLICIES IN GUATEMALA

Carlos E. Figueroa R.<sup>1</sup>

## INTRODUCTION

Forestry resources are becoming increasingly more important in the collective conscience of Guatemalan society, and, therefore, deserve more attention.

Given the above, it is necessary to define policies that are consistent with the times and which can be applied. At the same time, more research is needed on forestry and agroforestry policies to ensure that they are consistent with the situation of the country.

## BACKGROUND

In Guatemala, the body responsible for forestry resources has defined three forestry policies.

The first policy was proposed in 1976. The fundamental purposes were:

- a) To conserve the existing forested area;
- b) To expand the forested area by organized artificial reforestation;
- c) To promote development of the forestry industry.

In order to implement the policies, four guidelines were established, one of which was to promote the use of fiscal incentives for artificial reforestation.

Of the policies proposed, the one to expand the forested area through organized artificial reforestation, based on the creation of fiscal incentives, had the greatest relative impact.

In 1983, INAFOR defined the second forestry policy (1983-1986), which contained long- and medium-term objectives.

---

<sup>1</sup> Director General, General Directorate of Forests and Wildlife, Guatemala.

The policy was oriented toward meeting the forestry needs of that period, promoting the rational use of forest resources and expanding the national system of protected areas. The policy document clearly stated what had to be done, but did not identify the mechanisms needed to do it or who would be responsible for them. It can be said that the 1983-1986 policy did not attain its objectives.

In 1988, INAFOR disappeared and the General Directorate of Forests and Wildlife (DIGEBOS) was established. The general objective of this institution is to fully develop forests through its rational or sustainable use and of their flora and fauna, in order to improve the standard of living of the population, principally those involved with those natural resources.

In order to achieve this, a series of policies similar to the 1976 policies was defined.

The three policies proposed did not lead to attainment of the established objectives, since the necessary mechanisms were not clearly defined.

## **FORESTRY RESEARCH**

The principal forestry policy research conducted in Guatemala includes:

### **Forestry Concessions**

Article 8 of the Forestry Law stipulates that concessions will be granted for forestry development only on national or municipal land, or land owned by autonomous or decentralized entities. To date, in Guatemala, no concessions have been granted for forestry development on lands held privately.

Since Guatemala has extensive forest areas under the national land tenure system, in 1992, the Forestry Action Plan of Guatemala, with the participation of other entities, organized a seminar-workshop on forestry concessions in Guatemala. Base documents containing the findings of studies on forestry concessions were used as the basis for discussion during the seminar. A document was produced containing the minutes of the seminar.



## **National Forestry Assessment**

In 1992, the International Union for the Conservation of Nature and Natural Resources (IUCN), with support from Intercooperation (IC) of Switzerland, funded the National Forestry Assessment.

### **Analysis of Natural Resource Policies**

The Office for Agricultural Reactivation (PARAGRO), under the MAGA/World Bank agreement, promoted the preparation of a study of natural resource policies. This study is being funded by the project for the agricultural development of the highlands, which is being executed by the Ministry of Agriculture and Food, with technical and financial assistance from the AID office.

### **CONCLUSIONS**

1. The policies promoted by Guatemala have not had the expected impact. In relative terms, the only exception to this is the policies to increase the forested areas by using fiscal incentives.
2. Although only in the early stages, research is being conducted on forestry policies.

### **REFERENCES**

- CABRERA GAILLARD, C. 1992. Consultant's report National Forestry Assessment; Regional Forestry Project. Guatemala, International Union for the Conservation of Nature and Natural Resources (IUCN) and Intercooperation (IC). pp. 73-84.
- DIGEBOS. General Directorate of Forests and Wildlife. Guatemala. 1986. Proceedings of 1985 meeting. Guatemala. 67 p.
- DIGEBOS. General Directorate of Forests and Wildlife. Guatemala. 1990. Proceedings of 1989 meetings. 92 p.
- FORESTRY ACTION PLAN FOR GUATEMALA AND FORESTRY ACTION PLAN FOR CENTRAL AMERICA. 1992. Proceedings of the Seminar-workshop on forestry concessions in Guatemala. Guatemala, Forestry Action Plan. 17 p, plus Appendices.

# **POLICIES AND TECHNOLOGIES FOR REDUCING THE RATE OF DEFORESTATION IN TROPICAL RAIN FORESTS**

## **REPORT OF THE RAPPORTEUR**

**Presenter: Adilson Serrao**  
**Rapporteur: David Kaimowitz**

- 1. Macroeconomic and sectoral policies can have more impact on forest management than forest policies per se. Urban policies influence migration to areas located on the edge of forests. Sectors such as stock-raising, commercial agriculture and the forest industry compete with natural forests for land use. It might even be said that natural forests represent a residual land use. Policies on settlements, prices of agricultural commodities, incentives and road construction all have an impact on tropical rain forests.**
- 2. It is important not to take a strictly conservationist approach to forest-related issues. Forest-related environmental services will not feed the population. In certain cases, deforestation is appropriate. Moreover, unless a sustainable development process is implemented that meets the needs of the population, forest conservation will not be feasible, since there will always be strong pressures from the poor who have no other way to make a living. It is important to stress the commercial goods and services that can be obtained from forests, and not only ecological services. At the same time, a greater effort must be made to determine the financial value of the environmental services provided by forests.**
- 3. It is argued that one of the main problems is the lack of clear and consistent forest policies. Others hold that the problem lies in the fact that policies are not implemented.**
- 4. The first step that must be taken in order to reduce undesirable deforestation is to eliminate incentives for the land-use conversions that cause it. There is evidence that by eliminating incentives to deforestation, Brazil has succeeded in greatly reducing deforestation in the Amazon region since 1988.**
- 5. Questions have been raised regarding policies on the creation of forest reserves and reserves for logging purposes. On the**

will make it impossible to maintain forest reserves. On the other hand, it is argued that logging reserves have not offered adequate socioeconomic options and that new policies are needed to deal with this problem.

6. Policies must be developed to offer incentives and to generate and transfer technologies aimed at intensifying small-scale production systems. There is already some evidence of increased production and greater demand for technology in the Brazilian Amazon region.
7. Technology policies and technological alternatives should be drawn up in conjunction with all concerned sectors, and bearing in mind the need for equity. Deeper and more continuous interaction between policy makers and researchers is also needed.
8. International agencies are still supporting projects that work against sustainable forest management. In particular, problems have arisen in connection with infrastructure projects on state property.
9. It is important to realize that the Amazon jungle is not the only tropical rain forest in the Americas. In fact, the tropical rain forest of Meso-America is in greater jeopardy than the Amazon.

# **THE DYNAMICS OF COMMERCIAL FOREST DEVELOPMENT IN LATIN AMERICA**

## **REPORT OF THE RAPPORTEUR**

**Presenter: Ignacio Cerda  
Rapporteur: David Kaimowitz**

- 1. The discussion centered mainly on clarifying aspects of the forest incentives established by Decree Law D.L. 701 in Chile. The following points were made:**
  - a. Chile only grants forest subsidies in respect of land that suitable for forests.**
  - b. Forest incentives have only been granted for 640 000 hectares of the 1 500 000 hectares planted in forests in Chile. The remaining area was planted because, even without subsidies, planting forests is more profitable there than growing annual crops.**
  - c. The incentives cover 75% of planting, management and pruning costs.**
  - d. The advantage of D.L. 701 is that it is a clear and stable mechanism. The text, with only 28 articles, has been maintained since 1974. It is due to expire in 1994, and there is a great deal of discussion as to whether it should be eliminated, amended or retained in its present form.**
  - e. Forest incentives are open to all producers, regardless of the size of their operations. In addition, CONAF has a specific program for small-scale producers which provides funding for 100% of planting costs.**
  - f. Recipients of the forest subsidy are required to keep the land as forest. If they change their land use, they are required to repay, with interest, all money received from the state. If the land is sold, the new owner will also be required to keep the land as forest.**
  - g. Production has not yet started on the first trees, which were planted with subsidies granted in 1975. It is**

planted with an initial investment of US\$ 120 million are now worth US\$ 1 200 million.

2. The prospects for marketing the wood products are positive. This is partly due to the fact that supply has fallen in the developed countries, and partly to the constant growth of demand.
3. Chile currently has around 23 million hectares of native forest; 13 million hectares are in protected areas, and nine million are under commercial production. At present, native forests are mainly used for cutting firewood and, to a lesser degree, for the production of lumber chips. There is a group in Chile that believes that these areas of native forest should be kept in their natural state. The private business sector argues that the main environmental service to be obtained from native forests used for production is the ground cover they offer. Biodiversity is guaranteed by the system of national parks. According to this argument, therefore, any type of land use should be allowed in the existing natural forests, provided that the ground cover is maintained.
4. One of the questions raised in regard to the Chilean case was whether the growth of the forestry sector was an example of the exportation of pollution-causing industries to the Third World. It was pointed out that to a large extent, the market for timber products in Latin America had been opened up as a result of the implementation of environmental protection measures in the developed countries. On the other hand, it was also pointed out that the Chilean timber industry has been investing large amounts of money in pollution-reducing technology, in response to pressures from the importing countries.

**THE UNITED NATIONS CONFERENCE ON ENVIRONMENT  
AND DEVELOPMENT AND INTERNATIONAL POLICIES  
ON FOREST RESOURCES**

**REPORT OF THE RAPPORTEUR**

**Presenter: Alicia Barcena  
Rapporteur: Henry Tschinkel**

- 1. It was obvious at the Rio Conference that the great interest in forest conservation shown by the United States was aimed at ensuring the absorption of CO<sub>2</sub>. It was clear that the United States intends to continue its current patterns of CO<sub>2</sub> emissions into the atmosphere. The industrialized countries are interested in locating forest crops and negotiating lease arrangements in order to have an "atmosphere cleansing" service. This means that they are prepared to pay in order to continue with their patterns of consumption of hydrocarbons.**
- 2. In order to monitor CO<sub>2</sub> emissions to the atmosphere, the President of the United States has proposed a "coal tax", or "energy tax". However, this raises a number of questions, such as: Who will pay this tax? Who will benefit from it?**
- 3. The forestry sector played only a minor role in the drafting of Agenda 21. In some Latin American countries, it is a very self-contained sector. This attitude will have to change if we are to reach those civil and/or political organizations that are sensitive to public opinion. Foresters need to work more actively to influence government and to improve communications with other sectors, including conservationists.**
- 4. FAO played an important role in the discussions on forestry issues. However, the governments did not conduct adequate consultations with ministries, entrepreneurs, trade associations and others who are involved in the sector; hence, the positions taken at Rio did not always reflect the views of the civil sectors, the NGOs, and others. Very few forestry experts were available during the discussions, and this adversely affected the quality of the reports produced.**

**It was interesting to note that 14 000 NGOs took part in the Rio conference, and that they generated 46 alternative treaties, as well as a declaration of principles regarding forest issues.**

5. **The matter of compensation was dealt with in Rio. It is important to assess the economic impact of such measures within the natural resources sector, particularly in the context of free trade policies. In some European countries, farmers do not oppose free trade because they receive incentives to practice sustainable land management.**
6. **Agenda 21 is not a legally binding instrument, and the countries that signed it are under no legal obligation to comply with its terms. It is an important document, however, because it is a political statement that has been accepted not only by the governments, but also by the international financial institutions that collaborate with the countries in defining sectoral and national policies. The World Bank, for example, will ask the countries to draw up national sustainable development programs and to comply with Agenda 21.**
7. **As far as representation in Rio is concerned, there was an imbalance in the geographical distribution of delegations, with the northern countries being better represented than the developing countries. Moreover, there were many more environmentalists and diplomats than representatives of other fields. The same situation obtained with regard to the language used in drafting documents. In general, producers were under-represented, although there were some delegations from major producer groups. That is why it is important, at this juncture, to raise questions and follow up on Agenda 21. All the United Nations agencies are committed to this task.**
8. **One of the main problems faced by the natural resources sector is that after the Stockholm Conference, environmental issues were divided among a number of sectors. This has led to the creation of many different institutions (ministries, secretariats, regional offices), and heightened the controversy over who should be responsible for conservation programs.**
9. **The United Nations is working to link the Development Agenda with the Agenda for Peace. In addition to the Rio Conference, three major meetings are on the international agenda, i.e., the Social Summit, the Population Summit and the Women's Meeting.**

# **ENSURING THE SUCCESS OF AGROFORESTRY AND SOCIAL FORESTRY PROGRAMS IN LATIN AMERICA: GUIDELINES FOR RESEARCH ON POLICIES AND INSTITUTIONS**

**Presenter: Ronnie de Camino  
Rapporteur: Anne-Marie Izac**

1. There are two main problems, i.e., the development models applied and the attitude of the population. Many economic policies based on development models applied in Latin America have had a negative impact on the distribution of wealth and have caused deforestation. In addition, there is an attitude problem, both in forestry and in other fields. Latin American societies seem not to have the necessary orientation or the internal energy they need to guide their own destinies.
2. If major changes are to occur in the forestry sector, both small and large producers must learn good business practices. The fact that large firms have been subsidized raises questions about their efficiency. As regard to small-scale producers, we may look at the example of the community of Hojancha in Costa Rica, where small-scale producers are organized and are successfully carrying out forest-related activities.
3. At present, there is enough awareness in Latin America to identify certain specific problems being faced by the region. Nevertheless, social and environmental problems seem to be the increasing. We are experiencing a serious crisis, where substantial changes must be made gradually, in order to arrive at effective solutions that will take into account the need for equity and justice. Whatever decisions are made, it must be borne in mind that the right to a suitable environment is a human right that enhances the dimensions of development. Such changes must go hand-in-hand with an on-going educational process.
4. Some of the traps that environmental programs fall into are the following:
  - a. **Technocracy:** This is the tendency to analyze technical solutions without regard to development solutions. Technical issues are an important aspect of environmental sustainability, but they are not the only ones that need to be addressed.



- b. **Overemphasis on economics:** Because decision makers are influenced by the information they receive from their economic advisors, they tend to think that actions can only be justified if they are profitable, i.e., there is the assumption that only what is profitable is viable. This leads us into the trap of trying to place an economic value on everything. Economic assessments of some projects conducted in Latin America show profitability rates of 18%. When the environmental dimension is included and the economic value of the environmental damage is assessed, the profitability rate only drops to 17%. These findings seem to imply that the environmental cost is small and policy-makers take this to mean that the decision in question will not create problems. Yet non-economic losses can still be quite important.
  - c. **Reluctance to take a political stand:** For a long time, forestry specialists have tried to stay away from politics. If we want to be successful, however, we cannot overlook political aspects of forestry and environmental issues. Politicians are sensitive to public opinion, and in most cases, only react under pressure. They must be persuaded that forest resources and the environment are basic needs of the population, and that they are closely linked with sustainable development.
5. Some of the most widely felt needs are the following: institutional change, better markets, changes in land tenancy systems, greater participation of the people, and decentralization of administrative units. These areas have been identified as factors that condition the development of the Latin American countries.
  6. Activities in the forestry sector must be encouraged, and they must be adequately monitored. The excessive and exclusive control exercised by forestry services has not contributed to the development of the sector.
  7. As far as organization is concerned, communities must organize in order to gain greater access to the circles of power and be allowed to play a part in decision making on matters that

---

directly or indirectly affect them. Clear guidelines must be established for the community participation in decision-making processes, especially in regard to social projects.

8. There is a danger that social forestry might be dealt with in isolation from other development topics. This has been the case with environmental and forestry issues, which have been pigeon-holed into separate sectors and are no longer discussed in the context of overall development. In this regard, one of the main problems is that decisions have been made in the United States, Berlin, Helsinki, etc. or in capital cities in the Latin American countries, but not in and by the communities that are directly affected by the measures or studies proposed. Hence, such measures either are not applied or they are discontinued once a particular project is concluded.

## FORESTRY AND AGROFORESTRY POLICIES FOR SUSTAINABLE HILLSIDE DEVELOPMENT

Presenter: Carlos Rivas

Rapporteur: Sara Scheer

1. Agroforestry has to do with all those practices involving multiuse species, including wood species, that are aimed at preserving the soil in order to allow for intensive land use that does not cause degradation. The problem of agroforestry is the fact that the systems that are most efficient -from the technical, scientific and economic standpoints- are precisely the ones that producers have the most difficulty adopting.
2. Some recent ECLAC projects have tried to establish agricultural development policies in three mountainous areas of Latin America: Guerrero, in Mexico; Cuzco, in Peru, and the coast of Chile. The main conclusions reached in those cases were the following:
  - a. Public institutions tend to view the situation of *campesinos* in poor areas as a purely social issue, and not as a production problem. Hence, large amounts of funding are invested in social programs, while not enough is done to strengthen production.
  - b. Clear territorial and environmental goals must be established for hillside areas.
  - c. More research must be done on methodologies for evaluation of natural resources.
  - d. Studies must be made of the rationale followed by different types of producers, bearing in mind the variety of land tenancy patterns.
  - e. Not enough research has been done on systems that would allow for high net productivity.
  - f. Research is needed on environmentally relevant processes; for example, dynamic studies should be made of poverty-degradation cycles.

- g. Investments must be made in areas beyond the hillsides in order to stabilize the situation.
3. Little progress has been made towards achieving comprehensive watershed management, although there is greater awareness in this regard. Central America has no programs for alleviating natural resource management problems in any of the watersheds where hydroelectric projects or drinking water supply systems are located. What is lacking is the political will, since the necessary legislation does exist. There is a definite imbalance, in as much as hillside farmers are asked to use appropriate cultivation and grazing techniques so as not to damage the soil and thus protect the dams in hydroelectric projects. Yet these same farmers do not have electricity in their own homes. They are asked to plant trees in order to protect sources of drinking water, yet the drinking water is not available to them.
4. In hillside areas, the main resource that farmers have is their labor, inasmuch as both land and capital are limited. Nevertheless, the demand for labor is often temporary, since their agricultural activities are temporary in nature. Research should be conducted on the use of labor on farms and its distribution over time. For example CATIE is now studying hillside production technologies in an effort to determine which ones are not abandoned by farmers once a project ends.
5. One urgent problem is that policies are often established according to the technology that is available, when they should be based on the social situation of the recipients. "Incentives" are often a mechanism for imposing available technology on *campesinos*. Research should be more participatory in nature, and based on user's needs.
6. Very little information is available about the economic contribution of agroforestry systems to farming systems. Many systems that have been ignored by research are socially accepted, and this situation should be evaluated. One problem with most research on agroforestry systems is that the studies have been conducted on flat lands.
7. Central America's situation is rather controversial: it has livestock in the valleys and crops on the hillsides. The

technical experts have concentrated on solving problems relating to poor soil use. However, no effort has been made to design a strategy and establish policies aimed at preventing the population from migrating to the hillsides. Research should be oriented towards land tenancy systems, mechanisms for gaining title deeds to the land, and population policies, among others.

8. Many hillside farmers are recent arrivals who have been displaced from flatlands. Their production systems are not suitable for hillside resources. Hence, their farming practices do not include conservation measures, and it is difficult for them to begin implementing agroforestry technologies.
9. Work is currently being completed on a study of 21 agroforestry projects in Central America and the Caribbean, organized by CATIE, the World Bank and IFPRI. This study stresses the economic impact of agroforestry at the household level.

# WORDS OF INTRODUCTION TO THE LATIN AMERICAN WORKSHOP ON RESEARCH PRIORITIES FOR FORESTRY AND AGROFORESTRY POLICIES

Ronnie de Camino V.<sup>1</sup>

It is a pleasure to address the inauguration of this Latin American Workshop on Research Priorities for Forestry and Agroforestry Policies and to welcome you.

I am here, first, as a member of the associate personnel of IICA, an institution that is taking decisive steps in the field of agriculture, natural resources and sustainable development. Its sense of commitment is clearly demonstrated by its active participation in this workshop.

I am also here as a representative of the GTZ, the German Agency for Technical Cooperation, which is cooperating with IICA on a project for sustainable development.

Finally, I come before you on behalf of the Center for International Forestry Research. CIFOR is an important achievement of the Consultative Group, which is finally making inroads in the field of forestry research. It marks a step by two institutions, one in forestry and the other in agroforestry, to coordinate their efforts and in many cases, combine their strengths to solve problems such as access to practical alternatives to deforestation.

You are all aware that the planet faces truly serious problems of poverty and the destruction of natural resources. A new edition of the book *The Limits of Growth* was recently published under the title *Beyond the Limits of Growth*<sup>2</sup>. Its conclusions simply reaffirm those hazarded 20 years earlier:

1. Human use of many essential resources and the production of many types of contaminants have already surpassed physically sustainable levels. Unless the flows of materials and energy can be checked, coming decades will see a relentless decline in food production, energy use and industrial production.

---

<sup>1</sup> IICA/GTZ Project, CIFOR Board of Directors.

<sup>2</sup> Meadows, D.H., Meadows, D.L., Randers, J. 1993. *Beyond the Limits of Growth*.

2. **Although this decline is not inevitable, two changes must be made if we are to prevent it. First, we need to undertake a comprehensive review of policies and practices that perpetuate ever-rising rates of material consumption and a growing population. Second, we must swiftly and drastically improve the efficiency with which we use materials and energy.**
  
3. **A sustainable society is still technically and economically feasible, and in fact could be much more appealing than a society attempting to solve its problems through constant expansion. The transition toward a sustainable society requires a careful balance between long- and short-term objectives. We would need to emphasize sufficiency, equity and quality of life over actual production figures. This calls for more than productivity and more than technology; it also requires maturity, compassion and wisdom.**

**We are all here because we care about the design of policies for sustainable development of the forestry sector, and even more, we would like to see the forestry sector contribute its full potential to sustainable and humane development in our society. As part of this concern, we must never forget these conclusions on the limits of growth.**

**Even as we survey this panorama of problems and possibilities, we are aware that the forestry sector, at least in this region, holds low priority and has failed to make much of an impact on economic development in most of Latin America. The countries have overlooked many opportunities to build a sector that could make meaningful contributions to human welfare and sustainable development.**

**However, this sector can blaze new trails by launching concrete actions for sustainable development, such as sectoral and inter-sectoral programs and projects. It must also undertake significant research initiatives to offer sustainable solutions to development problems.**

**Some years ago, as part of the process of devising the Plan of Action for Tropical Forestry, several exercises were held to visualize an international system of forestry and agroforestry research. One such exercise was the Bellagio Forestry Task Force, which proposed research priorities and offered several alternatives for organizing international forestry and agroforestry research. Other actions followed, such as the International Forestry Research Panel convened**

by the Technical Advisory Committee to the CGIAR, and the so-called Group of Five, whose assignment was to draft proposals for the CGIAR on how to include this topic in the system of international centers. The result of these efforts was the entry of ICRAF into the CGIAR system and the creation of CIFOR as a new international center.

In general, reviews of research needs and priorities always emphasize research on forestry and agroforestry policy. While it is true that we still lack technology to solve many of our problems, there are clear political, economic and social constraints that prevent even available technologies from being applied. Despite the absence of policy research, the research institutions in forestry, agroforestry and natural resources have failed to build any tradition for doing this kind of work.

In order to address these shortcomings, in 1991 IFPRI, IUFRO, SPDC, AID, FAO and the FFSD program at the University of Minnesota organized a first meeting in Washington D.C. to identify policy research issues related to forestry and agroforestry.

The Washington workshop identified several high-priority areas for research:

1. Relationships linking population distribution and growth to deforestation and land use in the humid tropics.
2. Options for the reclamation and use of degraded forest lands in dry regions.
3. Intensive, sustainable land-use systems involving trees in upland watersheds and the preservation of woodlands.
4. The role of trees in income security and welfare.
5. Inter-sectoral forestry policy issues that affect the forestry sector.

One of the major recommendations of the workshop was that regional follow-up workshops should be held to identify shared issues important to several countries in each region. The workshops could lead to solutions in the form of cooperative arrangements among the countries and their institutions; these same arrangements might provide



a means for the centers of the CGIAR System to identify important areas for research and cooperation with national systems.

The workshops in Asia and Africa took place during 1992, with the cooperation of IUFRO, FAO, IFPRI, ICRAF and CIFOR, and support from the donor community.

The workshop we are inaugurating today was called jointly by IICA, CIFOR and IFPRI, with support from IDRC, GTZ and CATIE's RENARM project. The objectives of this workshop are:

1. To identify and propose topics for research responding to a limited number of high-priority problems surrounding policies on forestry and agroforestry activities. The issues identified could become individual or collective research agendas for national, regional and international institutions in Latin America.
2. To discuss ways in which research on the problems identified can be more effective and make a more positive contribution to solving problems and eliminating barriers to conservation and sustainable management of forest and tree resources in Latin America.
3. To identify institutions and researchers, whether national, regional or external to the region, able to conduct this high-priority research; in the case of high-priority problems common to several countries, regions or ecological systems, to identify potential partners in network research.
4. To explore needs for follow-up on the Workshop, which could include research and training, that will provide a means to implement the proposed research agenda.

These workshop objectives will be met using several different methods. Papers will be presented on high-priority issues, and will be discussed together with related issues in plenary sessions and work groups.

The following areas have been identified for discussion:

- ▶ Policies and technologies to contain deforestation in tropical moist forest areas.

- ▶ Dynamics of commercial forestry development in Latin America.
- ▶ The role of forestry and agroforestry activities in the sustainable development of upland zones.
- ▶ Institutional and policy incentives for successful social forestry and agroforestry.
- ▶ Inter-sectoral and inter-regional considerations, and their impact on forestry policy.

The guests were carefully selected and invited in their personal capacity, not as representatives of any institution or country. It was felt that the latter would not have produced a working meeting, but simply one more example of the type of meetings, congresses, symposia, expert groups and the like, by which we are constantly bombarded.

I hope this helps you understand the background and rationale for this meeting.

Now I would like to talk about CIFOR.

CIFOR was created in July 1992, following a relatively lengthy gestation. If a human being takes nine months to form, it took CIFOR approximately nine years.

The CIFOR headquarters is located in Bogor, Indonesia, and has been in operation in provisional facilities since May of this year. The Director General, Mr. Jeffrey Sayer, has been devoted for many years to the causes of conservation and natural resource management.

CIFOR has now undertaken the same processes practiced by all the international centers in the CGIAR system. It is preparing a strategic plan and a medium-term (five-year) plan, and in this exercise has found support from the system. The Director General and the Center's Board of Directors have sought the input of distinguished scientists and other experts in preparing these two basic operating documents. They have now set out broad lines of action as a general framework, and details will be filled in by program directors and other staff as they join the new center.

**The rationale of CIFOR:**

Forests and trees are essential to rural and urban welfare, economic development, sustainable agricultural development and global environmental protection. However, this important role is lost when forests are destroyed and resources and soils are degraded. Strategic research with international support can make a significant contribution to solving these problems.

**The mission of CIFOR:**

- ▶ CIFOR will promote the sustainable welfare of people in developing countries, particularly in the tropics, through strategic and applied cooperative research on forestry and forest systems, and will promote the use of improved technologies and practices for managing natural resources.

**The objectives of CIFOR:**

Through strategic partnerships with a broad range of national and regional research institutions, CIFOR will strive:

- ▶ To strengthen the capacity of national research to make meaningful contributions to optimizing the use of forests and forest lands.
- ▶ To improve the world-wide scientific basis for making decisions that influence or affect forests and woodlands.
- ▶ To develop technologies that will improve the yield of goods and services from the forest, making sure that these technologies are sustainable and that the resulting benefits are distributed equitably among all sectors of society (especially to those who have been most neglected and marginalized).

**CIFOR research will be oriented toward:**

- ▶ Alleviating poverty and generating income (research into policies, management of forests and degraded areas, use of forest products and services).

- ▶ **Improving the sustainability of the rural economy (research of the biological base, management techniques, social forestry in degraded areas, buffer zones in high-priority ecosystems).**
- ▶ **Making rapid, significant contributions to knowledge (reducing deforestation, sustainable forest management for indigenous populations, squatters, biodiversity).**
- ▶ **Improving the capabilities of national research institutions; CIFOR will transfer its own experimental results to them so they can pursue strategic, adaptive and applied research.**

**CIFOR's guiding principles:**

- ▶ **It will be a focal point in the CGIAR, taking leadership in forestry research of world-wide scope, through a global strategy with a strong eco-regional emphasis.**
- ▶ **First and foremost, it will address strategic problems, weighing the comparative advantages of existing institutions and developing strategic channels for cooperation.**
- ▶ **It will be committed to strategic research, focusing on processes and oriented toward ecosystems and an integrated view.**
- ▶ **It will strive to develop a sufficient critical mass of resources and scientific capability.**
- ▶ **It will always remember that research must remain relevant and serve the needs of developing countries in their efforts to achieve sustainable land-use practices.**

**CIFOR's operating approach:**

- ▶ **Conduct direct research by staff scientists at its headquarters in Bogor and by research stations in the regions (the ratio of headquarters budget to field budget is estimated at 70/30).**

- ▶ **Enter into agreements with institutions in developed and developing countries, including centers of the international system. A special form of cooperation has been worked out with ICRAF to transform areas of overlap and competition into zones of joint strength for the benefit of the system.**
- ▶ **Establishing new networks or strengthening existing ones, including networks of research projects.**

**CIFOR will develop its own criteria for setting priorities, always bearing in mind the effects on people in groups and communities; the effects on natural resources; and the efficiency of the research process. In other words, CIFOR wants to conduct the highest quality research for the benefit of populations in the developing countries and for sustainable management of natural resources.**

**The Center has already undergone a lengthy process of consultation with individuals and specialized institutions, to determine a program structure and preliminary research priorities. The programs listed below have taken shape through this process. Although they are independent, they will work interactively.**

- ▶ **Policy development**
- ▶ **Management and conservation of natural forests**
- ▶ **Reforestation of degraded areas**
- ▶ **Products and markets**
- ▶ **Support for research and information**

**For the purposes of this workshop, I will focus on the Policy Development Program. There is no question that this program holds top priority in the new Center. Again, the idea is to move as quickly as possible toward sustainable human development in the developing countries.**

**The main activities that will take place under the policy development program are:**

1. **Research on policies and incentives for guaranteeing forest sustainability, trying to answer such questions as:**

**What policies might discourage internal migration into forested areas?**

**What policies could relieve migrants of the need to clear the forest?**

**What policies and social structures might facilitate sustainable management of forests and other forest formations (open forest)?**

**What policies and incentives are needed to reforest degraded areas?**

2. **Research of systems for equitable distribution of the benefits and costs of goods and services from the forest; it will ask such questions as:**

**How does the demand for forestry goods and services change with the level of development, and how, at the same time, do perceived values change?**

**How can equity be encouraged and promoted, in its own right, as a way to promote forestry management systems?**

3. **Research on how to bring about policy change, trying to answer questions such as:**

**Why do so many reports go unnoticed and their recommendations ignored, even though they identify great losses to society as a result of inappropriate government policies and actions?**

4. **Research on forest employment and income, trying to answer such questions as:**

**What kinds of policies might offer incentives for creating employment opportunities without degrading resources?**

5. **Research on the world's forestry resources, where they are found and what types are available, to meet the future demand for goods and services. The questions to ask are:**

**What do the world's major forest formations contribute in terms of demand for products and services, and maintenance of the world's atmospheric balance?**

**How do today's trends in the world supply of resources affect forest dwellers and the poor in tropical zones? How can negative effects be avoided and positive effects, reinforced?**

The intention of CIFOR's presentation in this forum is to provide workshop participants with a frame of reference on one of the institutions that have convened this meeting. Like the other institutions, CIFOR hopes to draw major inputs from this workshop for answering the questions of what to study, how to study it, and with whom to do pending research.

**Thank you very much.**

**REGIONAL WORKSHOP ON NEEDS AND PRIORITIES  
FOR FORESTRY AND AGROFORESTRY POLICY RESEARCH  
IN LATIN AMERICA:  
INTRODUCTORY REMARKS**

Manuel Paveri-Anziani<sup>1</sup>

A sustained effort to reorient forest policies is underway in many countries throughout the world, and Latin America is no exception. This is attested to by the fact that the Tropical Forestry Action Program (PAFT) has been so widely accepted.

Twenty-three countries in three subregions made up of countries belonging to the Amazon Treaty, the Caribbean Community and the Central American region have completed or are in the process of defining and implementing forest policies, plans and programs. All of these are geared towards strengthening the national and regional forestry sectors bearing in mind the need for sustainable management of forest resources.

This has opened the way for the many different forest-related sectors -public, private, community or NGOs- to conduct, on a continuing basis, effective programs designed to offer guidance and introduce new developments in this field.

The reorientation of policies is a particularly complex undertaking which calls for a sound understanding of the processes involved, especially on the part of those who are responsible for proposing and implementing policy decisions. FAO assigns high priority to providing technical assistance in policy analysis.

In this regard, FAO cooperated with the International Food Policy Research Institute (IFPRI) in organizing the workshop on forest research policies held in July 1991 in Washington, and in the expert consultation on development of forest policies and their implications for research in the Asian and Pacific countries, held in Bangkok in October 1992. It has also participated in regional meetings on the subject, such as the one held in Kenya in December 1993 and this one in San Jose, Costa Rica.

---

<sup>1</sup> Senior Forestry Officer, Policy and Institution Branch, Forestry Policy and Planning Division, FAO.



This workshop offers yet another opportunity for experts in the region to exchange their experiences and identify specific research priorities in the field of forest policy.

The discussions that will be held at this meeting will help us identify the main aspects and problems that must be borne in mind in formulating research policies at the national and regional levels and in establishing the purposes and lines of action to be followed in implementing those policies, bearing in mind specific situations in the forest sector at the regional level.

In general terms, an adequate amount of research has already been done on the role played by forestry and macroeconomic policies in maintaining forest resources and the contribution they make to sustainable development. However, we need to gain a better understanding of how these policies interact and how they can effectively promote sustainability, which is essential to the conservation of forest resources for present and future generations.

The relationships between natural resources and national development and between poverty and environmental degradation, have a direct bearing on the problems of the sector. This means that policy actions in the various forest-related sectors cannot be adopted independently or in isolation. Policies, programs and sectoral strategies must all be interrelated and complementary to each other. It appears, however, that in the forest sector, natural resources are seen as an object and not as a resource to be used to achieve economic, social and environmental benefits for society.

Things are beginning to change in the region, however. As people become aware of the situation, the forest sector has begun to define policies and programs that take into account the needs of those who are directly or indirectly involved in forest-related activities, whether these be institutions, associations or individuals.

Much has been said but little has been done about the intersectoral linkages of development processes. It is not easy to ensure a more comprehensive approach to policy formulation and even less so, to implementation.

Recent structural adjustment programs and macroeconomic policies that have affected our countries are posing new challenges to the forest sector, incorporating aspects such as privatization of the

resource, transfer of greater responsibilities for management and utilization of these resources to other institutions (public, private, NGOs, rural communities, local organizations, etc.), and substantial reduction of public expenditure which, in many cases, has further diminished the scale of forestry services carried out by institutions.

The forest sector also faces technical and institutional challenges relating to the environment. This issue has become very important after the Rio Conference, and must be addressed by the governments. There has been some confusion about where the forest sector fits within the context of environmental problems, and a tendency to relegate it to a lower position among institutional priorities; some would even go so far as to say that the progress that had been made in the sector up to now has been set back as a result of competition with other sectors, such as agriculture. This situation is further aggravated by the fact that many governments and international cooperation and funding agencies have given priority to environmental issues, with forestry being only one of many parts.

The consequences of the above situation are evidenced, not only in this region but throughout the world, in the increased degradation and, in some cases, the disappearance of forests as they give way to agricultural and industrial expansion; the exodus of rural populations to urban areas; the economic crises being faced by many countries, which has brought about a return to the countryside, with the problems that creates; the reduction of resources for forest-related institutions and their programs; the disappropriation of public forest areas, which has an obvious impact at the local level and in the rural communities that depend on these resources; the management and administration of resources by new agents or institutions, and the significant institutional changes in public forestry programs and national and international cooperation and funding strategies.

The complexity of those factors has made it necessary to rethink the traditional methods of study and sectoral analysis, and points to the need to look for new processes and mechanisms for defining, formulating and implementing policies, strategies and programs in the forest sector. This is the main challenge we will be facing over the next few years. This workshop can and should contribute to such a review and should offer guidance for the definition of priorities relating to the current development needs of the forest sector.

For decades, FAO has collaborated with efforts to strengthen the regional forest sector. Almost if not all the countries are receiving some degree of support, through different mechanisms and cooperation programs. Despite the past and present problems of the Latin American forest sector, it is still much better off than in other regions, not only because of the size of the forests but also because of the quantity and quality of the human resources that are available.

That is why in recent years, FAO has limited its action mostly to serving as a catalyst and developing national capabilities so as to enable the countries and institutions of the sector to take over the management of their forest resources with only a limited amount of support, especially external support.

One of FAO's ongoing concerns has been the promotion and organization of regional technical cooperation networks. More than twenty such networks, on different topics, are currently in place. These networks have made it possible to identify individuals and institutions working in technical fields that are of interest to the region, linking them together nationally and regionally in order to carry out programs that are of mutual interest, and facilitating the exchange of human, technical and information resources. There are four such networks in the field of forestry, i.e., agroforestry systems, wood-based energy, national parks, other protected areas and wildlife, watershed management and, specifically for the Caribbean, the network on forestry and related environmental aspects.

In addition to encouraging this activity, which has been given priority by the Regional Office for Latin America and the Caribbean, FAO is providing support for national efforts to define forest policies, plans and programs, by means of PAFT. This includes projects for strengthening and encouraging forest development through the participation of *campesino* communities, including a program on trees, forests and people, which plays a significant role both in the technical field and in research and development of appropriate policies and mechanisms for community management of resources.

In the area of institutional development, and in response to the challenges mentioned above, the FAO Forestry Department is conducting a study on the history of forestry institutions in Argentina, Brazil, Honduras and Mexico, with a view to analyzing the effect on those institutions of certain political, economic and social factors or circumstances existing in those countries, in order to allow for a better

---

understanding of their prospects and to ensure an appropriate response to the new circumstances. This question, which is a matter of concern to many forestry institutions and specialists in the region, will be studied in greater depth at the meeting of the Latin American and Caribbean Forestry Commission, to be held in Montevideo in 1993.

Finally, in view of the many changes that are taking place in forest-related institutions and of the need to offer support and assistance to FAO member countries in connection with sectoral policies and strategies, in 1994 the Forestry Department will begin a more thorough study of national forest policies. This will give continuity to similar studies that have already been carried out in Europe and in Asia and the Middle East, as well as the one that is currently underway in Africa.

**THE INTERNATIONAL FOOD POLICY  
RESEARCH INSTITUTE (IFPRI)  
Washington, D.C., E.U.A.**

Peter A. Oram<sup>1</sup>

I would like to join Ronnie de Camino in welcoming you to this workshop on research priorities for forestry and agroforestry policies in Latin America, which IFPRI has organized jointly with IICA, with support from CIFOR, IDRC, and GTZ.

As you will have heard from Ronnie's introductory address, this is the fourth in the series of workshops on this important topic, which was inaugurated internationally in Washington in 1991, and is the third Regional Workshop. We have distributed relevant material from those workshops here for your information.

After this workshop, we hope to develop with CIFOR a consolidated report, which will highlight common issues cutting across regional and national boundaries and related research priorities; and identify appropriate international and national action to get the necessary research implemented and the results incorporated into policies. In this connection important issues raised at the previous workshops are: how to raise the status of forestry and agroforestry with policy makers vis-a-vis other sectors; and how to build institutional capacity to undertake policy-oriented research both regionally and nationally. In order to be able to deploy scarce human and financial resources most effectively to deal with the wide range of potential research problems, there is a need for a sharper definition of research priorities. As Dr. Frosty Hill, one of the founders of the CGIAR once said, "There are many interesting problems requiring research: some of them are important". We hope that this workshop will help to identify the latter.

I would now like to turn briefly to describing the mandate of my own institute, IFPRI, and its current and proposed work on environmental issues, especially forestry and agroforestry projects.

The International Food Policy Research Institute (IFPRI) was established in 1975 at a time when there was serious concern about the world food situation, in order to identify and analyze national and international strategies, with a view to improving the food situation of

---

<sup>1</sup> Research Fellow Emeritus, IFPRI, United States of America.

low-income countries. Although the main objective of IFPRI's research is to increase food production and improve food security and nutrition in the third world, many complex factors that go far beyond the food sector itself are involved in this effort. Thus, the Institute's research program is quite broad and is designed to encourage the participation of a whole range of researchers in international and national institutions, as well as to generate information that will be useful to them and to universities, administrators, policy makers and all those involved in shaping public opinion in the field of international policy. IFPRI is one of the 17 institutes of the Consultative Group on International Agricultural Research (CGIAR), and is the only one that has a specific mandate to conduct research aimed at policy formulation. We work closely with other institutions in the CGIAR system, three of which (CIAT, CIFOR and ICRAF) are represented at this workshop, as well as with the World Bank, regional banks, FAO and regional organizations such as IICA, our host at this meeting.

## **STRUCTURE**

IFPRI has five divisions which carry out research in Environment and Production Technology, Markets and Structural Studies, Food Consumption and Nutrition, Trade and Macroeconomics and Extension and Special Development Studies. However, although each division has a specific research program, many of the projects cross these lines and call for multidisciplinary team work. Similarly, although the staff of IFPRI has a strong core of economists, it also covers a number of other disciplines. We also try to supplement our own capability by working in close cooperation with other institutions. Although our research is oriented towards policy formulation, and is designed to help policy makers in their search for effective and sustainable food strategies, IFPRI's work is not limited to the macro level, but also includes studies in the field and in households, in order to provide the information and the understanding that are essential to carrying out policy recommendations.

## THE ENVIRONMENTAL PROGRAM (EPTD)

Research on the subjects that are most pertinent to this workshop is conducted by the Environment and Production Technology Division (EPTD). This is the newest division of the Institute; it was formally established in 1992, with a view to better integrating the Institute's work on agricultural and food production, and bearing in mind the fact that there is increasing concern about the need for sustainable management of the natural resources base, on which all production depends.

The EPTD program has three major projects pertaining to the ecosystem. Two of these have a significant component of research on forestry and agroforestry policies, while the third one focuses on degradation of the environment and on improvement of agricultural productivity under irrigation. These projects deal with issues such as property rights and community action, management of agrochemical products and cultivation practices for intensive agriculture. They also cover extension and education in agricultural research.

The first of IFPRI's two ecosystem projects -which focus on forestry and land use- deals with the role of policy in efforts to check degradation of resources on the forest edge, specifically in the Brazilian Amazon region.

It is quite likely that the pressures -from outside and inside- on this vast region of Brazil will continue, and that they will lead to further destruction of the forests, with the resulting degradation of the environment in that zone. Outside the Amazon region, the Government of Brazil has stated its intention of settling 300,000 new immigrants throughout the Brazilian Amazon over the next three years. Within the region, more extensive land use patterns are being adopted, as livestock production is increased on small- and medium-sized farms, and this is causing rapid deforestation.

The key to slowing down the rate of conversion of forests among the farmers living in the Amazon region is to improve and sustain the productivity and profitability of agricultural activities (including agroforestry, livestock, logging and activities carried on outside the farms) on lands that are already under cultivation, while at the same time increasing the opportunity cost to farmers of further conversion. Likewise, the flow of new immigrants to the edge of the jungle (either outside or inside the region) should be slowed down. The

challenge to researchers, donors and policy makers is to identify technologies, policies and institutional arrangements that can help reverse this situation.

The research and extension activities that have been aimed at generating technology for the Brazilian Amazon region lack certain components relating to the social and political sciences that should characterize sustainable development. In order to meet this challenge, IFPRI is working in close cooperation with EMBRAPA to strengthen these aspects through applied research at specific locations, research at the macro level, and the development of methodologies.

The second major ecosystem project focuses on management, by families and groups, of natural resources on the hillsides of Central America. This is part of a broader project on fragile land that includes similar research studies on other ecosystems.

A high percentage of the rural population lives on hillsides, which in turn represent a large share of the farm and forest lands in Central America. Hillsides give rise to serious concern because of the high rates of poverty and degradation of natural resources resulting from growing population and market pressures, despite the many innovations that have introduced locally. Proposals have been made for large-scale investments in agricultural and sustainable forestry development on hillsides. Nevertheless, the evaluations that have been made in the field indicate that public policies themselves have discouraged sustainable management of natural resources because of confusion about ownership rights, inadequate regulations, distorted pricing of factors and production and market restrictions.

IFPRI, along with the El Zamorano Pan American Agricultural College, CIAT, IICA and other national and international cooperating agencies, is conducting a project for dealing with these issues. The project, which will initially concentrate on Honduras and Guatemala, will have the following objectives: (1) to explain variations in management of community and family resources; (2) to evaluate the impact of alternative development policies and strategies on the living standards of farmers and on incentives for resource management; and (3) to strengthen institutional capacity for policy research and community evaluation of natural resource management.

IFPRI expects to post two researchers in the region by the end of 1993, one in Honduras and one in Guatemala. Their activities will



include an overall review of the literature and of experiences in the field, mapping of community resources in selected areas, spatial analysis by means of aerial photography, case studies of families and groups for purposes of analyzing resource management strategies, and formal surveys to determine and explain variations in resource management. The project also includes training workshops, policy seminars and other activities designed to promote the exchange of information, development of methodologies and political dialogue in Honduras and in the region.

## PRESENTATION OF RAUL MORENO<sup>1</sup>

In this brief presentation I will summarize the activities that CIAT is conducting related to research in agricultural policies and also those related with forestry and/or agroforestry.

Up to know, the topic of research in agricultural policies hasn't been a priority for CIAT. The research that this institution conducts in agricultural policies, is mainly related to those policies that affect some tendencies of the national and international markets in some specific items that are a main concern to CIAT. For example, in the case of Latin America, this applies to cassava, beans, rice, and some by-products of the animal production systems. Even so, this is a periodic activity, mainly of monitoring, done by the Socioeconomic Section of each of the programs within the Germplasm Division of CIAT.

Some other times, when CIAT conducts some type of analysis of agricultural policies, it is done by studying the effects or impacts that a certain technological component has in a region or country, once it is being used. In other words, we are talking about a study of those policies that affect the technological impact in a specific region.

Normally, this technological components are related to a new crop, whose progeny has been developed by CIAT or other national center.

In other cases, where CIAT has been involved in the analysis of agricultural policies, for example, in specific projects of production and marketing in selected countries in Latin America. In this cases, CIAT gets involved in the analysis of national and international policies of regional type, that affect the processes.

Finally, CIAT gets involved in some analysis of technology policies, mainly in aspects related with research and dissemination of technologies in countries, where, for some reasons CIAT has a particular interest. This cases are frequently related with the institutional analysis, research institutions and development of agricultural technologies.

---

<sup>1</sup> Coordinator of the Hillside Program of the International Center for Tropical Agriculture, CIAT.

The results of this studies are used in the practice to better adequate CIAT's training programs.

These four points summarize what CIAT has traditionally been doing with regard to agricultural policies.

The analysis of policies that affect forestry and this hybrid called agroforestry, has not yet been the object of study by CIAT. However, the relatively recent decision of CIAT to open a new line of research in resources is starting to generate changes. We anticipate a greater emphasis in the analysis of policies that can affect the environment where agricultural production is taking place.

CIAT's Division of Research and Management of Resources has four research areas: Agriculture, agricultural frontier, flatlands'agriculture, and hillsides agriculture. In reality, these four research areas are integrated under one program called Land Use Program, that studies the policies that affect the environment, as related to agriculture.

This program , together with the other programs oriented by ecosystems, should, after following a process of physical-biological and socioeconomical research, be able to formulate what is called "politics guide" for specific regions and/or at an aggregated level.

The objective is to supply technical elements, that allow to proceed in the best way possible, assuming that a true political interest exist to formulate rational policies and that the institutions have the capacity to implement them. Besides, we also have to assume that the capacity exist to study the effect of those policies and the possibility of modifying them according to local conditions.

The formulation of this policy guides will be done in coordination with other national institutions and other international institutions like IFPRI, for example, with whom we already have signed some agreements.

We do not have yet any results from this process of study of policies that affect the environment in which production takes place, due to the short period of time in which the institution has been conducting research in natural resources.

This summary, which includes some background on CIAT's activities, and some future actions, is my contribution to this Workshop. Thank you very much.

**REGIONAL WORKSHOP ON NEEDS AND PRIORITIES  
FOR FORESTRY AND AGROFORESTRY POLICY RESEARCH  
IN LATIN AMERICA**

**CLOSING ADDRESS**

**Dr. Ronnie de Camino V.**

**Dear colleagues:**

**We are coming to the end of a week of intense work and intense discussions.**

**Our task was to consider priorities for research on forestry and agroforestry policies with a view to finding solutions to the problems we are facing in the Latin American region. We have compiled a great deal of material on topics relating to research, as well as on limitations and requirements, that will be useful both to the international centers represented here and to the countries.**

**We have tried to focus not only on the problems of the forest sector, but also on how that sector can contribute to the development of our societies in the best sense of the word, that is, in the sense of human development.**

**In our midst, as in the outside world we represent, we have heard many different viewpoints, some argued with fundamentalist fervor, and we have all strongly defended our different beliefs. This has been important, valuable and useful, and has saved us from having a colorless meeting. We have not lost sight, however, of the fact that our governments endorsed the terms of the Rio agreements on sustainable development, and we want to believe that they have done so with every intention of meeting their commitments. We also want to believe that the entrepreneurs were acting earnestly when they founded the Entrepreneurial Council for Sustainable Development and that they really do want to change their agendas and supplement their models with new dimensions, pursuing a more complete and balanced set of objectives.**

**Some of those present have advocated systems under which the market would take care of everything, while others have advocated a system in which original natural resources would virtually remain untouched.**

In science, truth is provisional, and in politics, there is no single solution. In the social sciences, we sometimes find it impossible to separate ourselves from our ideologies. Nevertheless, I believe that we should choose human development and the sustainable use of natural resources for the sake of our societies, not just because we are fond of romantic visions, but because we are earnestly concerned about the future - both short-term and long-term. Sustainable development is possible, and economics, equity, and technology should march hand-in-hand, for the benefit of present and future generations, consistently placing emphasis on all aspects of the issue, and shifting the focus as urgent needs arise.

We have identified important research priorities, we have identified limitations, and we have established requirements for achieving effectiveness. We believe that policy research can be very useful and can produce results quickly for the benefit of the region and of the individual countries.

We have also identified the main concerns that should be addressed by the international centers. I believe my colleagues from IFPRI, CIAT, ICRAF and IICA, as well as we in CIFOR, will be very grateful for these suggestions.

As far as CIFOR is concerned, this is close to an ideal situation. We are receiving an authoritative message on the main issues for policy research at the global and regional levels, and we are thus being presented with an opportunity to make a rapid contribution towards solving the problems of deforestation and poverty. On behalf of our Board of Directors and our Director General, I want to thank you all.

Much more important, however, is the fact that we have established personal contacts that will enable us to make further progress in future, and to create synergistic relationships between individuals and institutions.

I want to thank the authors of the papers presented at each working group. The papers were designed to offer some guidelines on the topics, in order to elicit agreement or disagreement and provide some elements to be borne in mind in the decisions of the working groups.

I also want to thank the institutions that have made possible this exchange of views by covering the cost of the meeting, namely

IDRC, CATIE/RENARM, IICA, GTZ and CIFOR. I believe that you have invested your resources wisely in bringing together such a significant group of outstanding and experienced people from throughout the region. I also want to express our appreciation to the other institutions that have offered us their support, such as FAO, IDB and ECLAC.

I especially want to thank IICA, which has demonstrated a great sense of responsibility and determination in addressing the whole question of sustainable development and has, for the first time, been a co-sponsor and active participant, through its technical and management staff, in a meeting on forestry and agroforestry. It has made a significant contribution to the tremendous task of organizing this meeting. We are happy to have been welcomed to IICA's Headquarters, and we trust that IICA will assume the role suggested for it by the workshop: keeping abreast of developments in forestry and agroforestry policy research, and bringing us together when necessary to review the progress we are making and the guidelines we have set out for ourselves in the light of the dynamics of economic, social and environmental development.

I want to mention with special appreciation my colleague María Ileana Mora, who set aside her own professional interest in the subject and devoted her time and energy to the less challenging and time-consuming job of getting everything ready so that we could work with the necessary logistical support.

I also want to publicly thank David Kaimowitz, who, through his intense work in the plenary meetings, and his role as moderator of meetings and working groups, has become a *quasi*-forester.

I also want to personally thank my colleague Peter Oram, who has worked hard, with the support of IFPRI, and who has done so much to promote our consultations at the global and regional levels. I believe his efforts are being rewarded.

Special mention must also be made of our secretarial staff, both in Program II and in the IICA/GTZ Project and CIFOR, to the conference room staff and the support team from the Directorate for Coordination of Institutional Affairs, and our patient and able interpreters, who must have sometimes had a hard time copying with the eccentricities of the different speakers. Despite these difficulties, thanks to our interpreters, we were able to understand each other.

I trust that we will all go home sharing the conviction that we must do much more for the forestry sector in our respective countries - much more than we have done so far- and that we must consistently convey the message that the forestry sector or, rather, the natural resources sector, can make a fundamental contribution both to the economic development and the equitable human development of our countries.

Finally, I want to repeat what I said in my first statement, and what was stressed by Nestor Altuve, with whom I have had the honor of working in a genuine sustainable development effort. We foresters must be proud of our profession; we must not be sorry or make excuses for having contributed to the planting of large areas of pines or eucalyptus trees, or having worked in the management of natural forests for timber production and other products, in the task of furthering sustainable management. We must try to do even better, improving the sustainability of our projects, trying to improve equity in our actions, but also, as at this meeting, we must become integrated with the other sectors of society and of science, in order that our contribution to the general well-being -both present and future- of all society may be better appreciated.

Thank you for coming and for contributing so effectively to this workshop.



**REGIONAL WORKSHOP ON NEEDS AND PRIORITIES  
FOR FORESTRY AND AGROFORESTRY POLICY RESEARCH  
IN LATIN AMERICA**

**IICA Central Headquarters  
San Jose, Costa Rica  
July 19-23, 1993**

**LIST OF PARTICIPANTS**

**Marielos Alfaro Murillo  
School of Environmental Sciences  
National University  
Apartado 86-3000  
Heredia, Costa Rica  
Tel. 37-6363 Ext. 2291, 2290  
Fax. 37-7036**

**Nestor Altuve  
Director  
CVG-Productos Forestales de Oriente PROFORCA  
Torre Fior P.H.  
Calle Londres entre New York y Trinidad  
Urbanización Las Mercedes  
Caracas, Venezuela  
Tel. 92-15-79  
Fax. 92-13-68**

**Luis Eduardo Astorga  
General Coordinator  
Regional Forestry Program for Central America (PROCAFOR)  
Apartado 371-1007  
San Jose, Costa Rica  
Tel. 55-3557  
Fax. 22-3371**

**Ron Ayling  
Senior Program Officer (Forestry)  
Head Office: 250 Albert St.  
P.O. Box 8500  
Ottawa, Canada K1G 3H9  
Tel. (613)236-6163  
Fax. (613)238-7230**

**Alicia Barcena**  
Executive Director  
Earth Council  
San Jose, Costa Rica  
Fax. 255-2197  
Tel. 223-6410/223-3418

**Carlos Brenes**  
Facilitator for Central America  
FAO  
San Jose, Costa Rica  
Tel. 20-0511/20-0512  
Fax. 32-6137

**Jens Bruggemann**  
Consultant  
UNRISD  
Germany  
Tel. 49 4214 23030  
Fax. 49 4214 099046

**Jorge Cabrera**  
Executive Secretary  
7ª Av. 13-01, Zona 9  
Edificio La Cúpula 2º nivel  
Comisión Centroamericana de Ambiente y Desarrollo (CCAD)  
Guatemala City, Guatemala  
Tel. (502-2) 320684/320685  
Fax. (502-2) 343876

**Ignacio Cerda**  
Chief, Economic Studies Division  
Instituto Forestal  
Huérfanos 554  
Santiago, Chile  
Fax. 562 212-5948  
Tel. 562 639-6189

Dean Current  
Coordinator Agroforestry Project  
CATIE/World Bank  
Turrialba, Costa Rica  
Tel. 56-6120  
Tel. (Others) 56-6137  
Fax. 56-0176/56-1533

Ronnie de Camino  
Specialist, Natural Resources  
IICA/GTZ Project  
Costa Rica  
Tel. 229-0222, International calls 229-3691  
Fax. 229-1620

Jean Marc Dubois  
Director, Forestry Department  
CIRAD  
45 bis Avenue de la Belle Gabrielle  
94736 Nogent/Marne CEDEX  
France  
Tel. 1-4394 4332  
Fax. 1-4394 4329

Luis Ferraté  
Regional Advisor on the Environment  
Inter-American Development Bank (IDB)  
San José, Costa Rica  
Fax. 33-1840  
Tel. 33-3244

Carlos Enrique Figueroa Ruiz  
Director General  
General Directorate of Forestry and Wild Life (DIGEBOS)  
7 Av. 6-70, Zona 13  
Guatemala City, Guatemala  
Tel. (Office) 73-52-11  
Tel. (Others) 73-52-09, 73-52-07, 72-07-36  
Fax. 73-52-11

Hugo Galletti  
Expert  
Mexico-Germany Agreement/Pilot Forestry Plan for Q-Roo  
SARH-GTZ  
Apartado 273  
Infiernillo No. 157, Esquina Efraín Aguilar  
77000 Chetumal, Quintana Roo  
Mexico  
Fax. (983)24424  
Tel. (983)24424

Javier Gatica Pardo  
Earth Council  
San Jose, Costa Rica  
Tel. 223-6410/223-3418  
Fax. 255-2197

David Gibson  
LAC Regional Forestry Planning and Policy Officer  
LAC/DR/RD  
Room 2242 New State  
Washington D.C. 20523  
Tel. (202)647-5677  
Fax. (202)647-8098

Nicolo Gligo  
Coordinator of Joint ECLAC/UNEP Unit  
on Development and the Environment  
Vitacura 3030  
Casilla 179-D  
Santiago, Chile  
Fax (56-2) 208-5051  
Tel (56-2) 208-0252

Rubén Guevara  
Director General  
CATIE 7170  
Apartado Postal 85  
Turrialba, Costa Rica  
Tel. 56-6081/56-1176  
Fax. 56-6166/56-1533

Alicia Grimes  
Policy Analyst, Forestry and Natural Resources  
Bureau for Latin America and the Caribbean  
USAID  
Washington, DC  
AID/LAC/DR/RD  
Room 2242 New State  
Washington, DC 20523  
Tel. (202)647-8078  
Fax. (202)647-8098

Stanley Heckadon-Moreno  
Central American Coordinator  
Sustainable Development Project (CCE)  
Smithsonian Tropical Research Institute (STRI)  
Apartado Postal 2072  
Balboa, Panama  
Fax. 0056-20 625942  
Tel. 507 276014

Ana María Izac  
Coordinator of Characterization and  
Impact Programme  
ICRAF  
P.O. Box 30677  
Nairobi, Kenya  
Fax. 254-2-521001  
Tel. 254-2-521450

Roy S. Jones  
Director  
Dept. of Forestry and Soil Conservation  
Ministry of Agriculture  
173 Constant Spring Road  
Kingston 8, Jamaica  
Tel. 809 924 2125  
Fax. 809 924 2626

**David Kaimowitz**  
Specialist, Technology Generation and Transfer  
IICA/Costa Rica  
Tel. (506)229-0222  
Fax. (506)229-4741

**Siegfried Kastl**  
ATP Social Forestry Project  
CAFOR Project  
Germany-Honduras Technical Cooperation (GTZ)  
Siguatetepeque, Honduras  
Tel. (504)73-21-92  
Fax. (504) 73-29-45/31-31-73

**Paul J. Martins**  
Independent Consultant  
1505 Ouimet St., Suite 44  
St. Laurent, Que. H4L 3R2  
Canada  
Tel. (Office) (514)747-2191

**Raul Moreno**  
Agronomist  
Coordinator, Hillsides Program  
CIAT  
IICA/Costa Rica  
Apartado 55-2200  
Coronado, Costa Rica  
Tel. (506)229-1107  
Fax. (506)229-4741

**Peter Oram**  
Research Fellow Emeritus  
International Food Policy Research Institute (IFPRI)  
1200 17th St. NW  
Washington, DC 20036-3006  
Tel. (202)862-5653  
Fax. (202)467-4439

**Fernando I. Ortiz Crespo**  
**Scientific Technical Secretary**  
**Instituto Italo-Latinoamericano**  
**Rome, Italy**  
**Fax. 396-590-9453**  
**Tel. 396-590-91**

**Manuel Paveri-Anziani**  
**Deputy Director, Forestry Policies and Institutions (FONP)**  
**Forestry Policies and Planning Division**  
**Depto. de Montes**  
**FAO**  
**Via delle Terme di Caracalla**  
**00100 Rome, Italy**  
**Tel. (Office) (39-6)5797-4048**  
**Tel. (Others) (39-6)5795-4140**  
**Fax. (39-6)5797-5137**

**Carlos Pomareda**  
**Director,**  
**Agrarian Policy Analysis and Planning**  
**IICA/Costa Rica**  
**Tel. (506)29-0222**  
**Fax. (506)29-4741**

**Carlos J. Rivas P.**  
**Director**  
**Comprehensive Natural Resources Management Program (MIREN)**  
**CATIE 7170**  
**Turrialba, Costa Rica**  
**Tel. 56-1754, 56-6279**  
**Fax. 56-1576**

**Jose Rente Nascimento**  
**Regional Advisor on the Environment**  
**Inter-American Development Bank**  
**Av. Horacio 1855, 6th floor**  
**Col. Polanco**  
**Mexico City, Mexico**  
**Tel. (Office) 580-2122 (ME)**  
**Tel. (Others)352831 al 34 (GU)**  
**Fax. 580-6083 (ME)**

**Sara Scheer**  
Research Leader,  
Arid Lands Development Policies  
International Food Policy Research Institute (IFPRI)  
1200 17th St. NW  
Washington, DC 20036-3006  
Tel. (202)862-5660  
Fax. (202)467-4439

**Carlos Seré**  
Independent Consultant  
Area of Agrarian Economics and Natural Resources  
Montevideo, Uruguay  
Apartado Postal 18944  
11500 Montevideo, Uruguay  
Tel. (598 2) 60-45-84  
Fax (598 2) 61-34-47  
Costa Rica mailing address: Apartado 6509-1000, San José

**Manuel Serrano**  
Directorate of Forestry Research  
National Botanical Garden  
Apartado 3370  
Santo Domingo, Dominican Republic  
Tel. (809)566-8321  
Fax. (809)541-3259

**E. Adilson Serrao**  
Director of Research  
EMBRAPA/CPATU  
Caixa Postal 48  
66.000 Belem, Para  
Brazil  
Tel. (Office) (091)226-9364  
Tel. (Others) (091)223-0800/0613  
Fax. (091)226-9845



---

**Rigoberto Stewart**  
Researcher  
Stewart Associates  
Apartado 1502-3080  
San Jose, Costa Rica  
Tel. 238-3140  
Fax. 237-4475

**Eduardo J. Trigo**  
Director,  
Technology Generation and Transfer Program  
IICA/Costa Rica  
Tel. (506)29-0222  
Fax. (506)29-4741

**Henry Tschinkel**  
Regional Forestry Advisor  
ROCAP/AID  
c/o American Embassy  
Guatemala City, Guatemala  
Tel. (502) 232-0322  
Fax. (502)232-0495

**Derek Webb**  
Research Advisor  
Universidad Católica  
Avenida V. Mackenna 4860  
Santiago, Chile  
Tel. 562 638-7811  
Fax. 562 638-1286

**REGIONAL WORKSHOP ON NEEDS AND PRIORITIES  
FOR FORESTRY AND AGROFORESTRY POLICY RESEARCH  
IN LATIN AMERICA**

**GUIDELINES FOR THE WORKING GROUPS**

1. Each working group should answer the following questions, within the context of the topic assigned to it.
2. Each workshop should produce a brief report based on these questions.
3. If there is time, the working group should add other questions that it considers important.
4. Questions:
  - a. What type of policy research has been or is being conducted?
  - b. What subjects should be given priority in policy research? Should different subjects be studied with regard to the different countries of Latin America?
  - c. What institutional requirements should be met in order to ensure the effectiveness of forestry and agroforestry research?
  - d. What are the potential limitations of policy research? How can these limitations be overcome?
  - e. What role does each of the different actors in the international community (IARCs, FAO, international NGOs, etc.) play in achieving the above objectives? What recommendations would you make to ICRAF, CIFOR, CIAT, IICA and/or IFPRI with regard to the design, organization and implementation of their research programs?

**SOME PUBLIC AND PRIVATE INSTITUTIONS CONCERNED  
WITH NATURAL RESOURCES IN CENTRAL AMERICA**

**COSTA RICA**

**Asociación Guanacasteca para el Desarrollo Forestal (AGUADEFOR)**

**Asociación Conservacionista Monteverde**

**Asociación San Migueleña de Conservación y Desarrollo**

**Asociación de Pequeños Productores de Talamanca**

**Asociación ANAI**

**Consejo Nacional de Investigaciones Científicas y Tecnológicas  
(CONICIT)**

**Conservation Areas (La Amistad, Arenal, Guanacaste)**

**Cooperación de los Sectores Forestal y Maderero (COSEFORMA)**

**Cooperatives (CoopeLlanoAzul, CoopePenin, CoopeSanJuan, Coopeagri  
R.L., CoopeAgromuebles R.L.)**

**County Agriculture Centers (Pérez Zeledón, Acosta, Santa Cruz,  
Orotina)**

**Desarrollo Campesino Forestal (DECAFOR)**

**Dirección General Forestal (DGF)**

**Finca La Pacífica**

**Fondo de Desarrollo Forestal**

**Fundación de Parques Nacionales (FPN)**

**Fundación Neotrópica**

**Fundación para el Desarrollo de la Cordillera Volcánica Central  
(FUNDECOR)**

**Inter-American Institute for Cooperation on Agriculture (IICA)**

**Junta de Administración Portuaria y de Desarrollo Económico de la Vertiente Atlántica (JAPDEVA)**

**Junta Nacional Forestal Campesina (JUNAFORCA)**

**Ministry of Agriculture and Livestock (MAG)**

**Ministry of Natural Resources, Energy and Mines (MIRENEM)**

**Monteverde Conservation League**

**National University (UNA)**

**Organization for Tropical Studies (OTS)**

**Productores Unidos de San Carlos**

**Regional Forestry Program for Central America**

**Technological Institute of Costa Rica (ITCR)**

**Tropical Science Center (TSC)**

**Tropical Agriculture Research and Training Center (CATIE)**

**Unión de Pequeños Agricultores de San Ramón**

**Unión de Pequeños Agricultores de la Región Atlántica**

**United Nations Food and Agriculture Organization (FAO)**

**University of Costa Rica (UCR)**

**University for Peace**

**Voces Nuestras**

**World Conservation Union (UICN)**

**Colegio de Profesionales Forestales de Honduras**

**Cooperativas Americanas de Remesas al Exterior**

**Corporación Hondureña de Desarrollo Forestal (COHDEFOR)**

**El Zamorano Pan American Agricultural School**

**FAO Office in Honduras**

**Federación Campesina Forestal**

**Federación de Tribus Xicaques de Yoro**

**Forestry Regions (El Paraíso, Copán, Yoro, Northwest, Latifoliada, La Mosquitia, Olancho, Francisco Morazón and Southern Zone)**

**German Technical Mission (GTZ)**

**MADELEÑA III - CATIE**

**National School of Agriculture**

**National Autonomous University of Honduras**

**National School of Forestry Sciences (ESNACIFOR)**

**Netherlands Cooperation Service**

**PRODAL**

**United Nations Development Programme (UNDP)**

**World Neighbors**

## **NICARAGUA**

**Central American University**

**Centro de Investigación y Promoción para el Desarrollo Rural y Social**

**Centro Nacional de Comunicación**

**FAO Office in Nicaragua**

**FAO Project New Guinea - Nicaragua**

**Instituto de Recursos Naturales**

**Instituto Tecnológico Forestal**

**Los Maribios Project**

**Servicio de Información Mesoamericana sobre Agricultura Sostenible**

**Unión Nacional de Agricultores y Ganaderos**

**Universidad Nacional Agraria**

## **PANAMA**

**Asociación Nacional para la Conservación de la Naturaleza**

**Colegio de Ingenieros Forestales**

**Fundación Manuel E. Melo**

**Fundación de Parques Nacionales**

**Instituto de Recursos Naturales Renovables**

**Simón Bolívar Inter-American Library**

**Smithsonian Research Institute**

**Universidad de Santa María La Antigua**

**University of Panama**

<b><i>Ejido</i> forestry concessions in the south</b>	GTZ and Sociedad Civil of Quintana Roo/Mexico
<b>Researchers' network for social forestry programs</b>	INFORANDES/Bolivia, Peru, Chile, Ecuador, Colombia
<b>Impact of MADELEÑA Project-Southern Coast</b>	ICAP Student/Guatemala
<b><i>Campesino</i> economy and sustainable development</b>	CIPRES/Nicaragua
<b>Economic policies on sustainable development</b>	National University of Costa Rica/Costa Rica
<b>Study of society and natural resources</b>	National University of Costa Rica/Costa Rica
<b>Dynamics of agricultural frontiers in Nicaragua</b>	Swedish Cooperation/Nicaragua
<b>Impact of SAPs on the rural population</b>	CRIES/Nicaragua
<b>Causes of deforestation in Central America</b>	UNRISD/Nicaragua
<b>Comparative evaluation of natural resource and forestry programs</b>	CATIE - University of Minnesota/Central America
<b>Comparative evaluation of soil conservation programs</b>	CATIE - World Bank/Central America, Dominican Republic
<b>Comparative evaluation of agroforestry programs</b>	CATIE - World Bank - IFPRI/Central America, Haiti, Dominican Republic
<b>Studies on economic, social and political concerns in a social forestry program</b>	PLAN SIERRA/Dominican Republic

<b>Analysis of agroforestry policies in Latin America</b>	<b>ICRAF-Alternatives to Slash and Burn/Latin America</b>
<b>Land rights of indigenous peoples</b>	<b>Yvy Averenda/Bolivia</b>
<b>Establishment of the Community Forestry Program in Central America</b>	<b>FAO-FTP/Central America</b>
<b>Analysis of Article 27 of the Constitution</b>	<b>ICRAF/Mexico</b>
<b>Evaluation of the Forestry and Agroforestry Program</b>	<b>GTZ/Bocas del Toro, Panama</b>
<b>Diagnostic studies for different countries</b>	<b>PAFT</b>
<b>Evaluation of the CODE Agroforestry Program</b>	<b>Yale University student/Panama</b>
<b>Analysis of the Agrarian Modernization Act</b>	<b>Organización Forestal/Honduras</b>
<b>Sustainable development strategy</b>	<b>UICN-CADESCA/Costa Rica</b>
<b>Analysis of forestry potential for Mayan communities</b>	<b>PAF MAYA/Guatemala</b>
<b>Economic and environmental policy</b>	<b>FLACSO/Guatemala</b>



**This book was printed at  
IICA Headquarters  
in Coronado, Costa Rica  
in October, 1994,  
with a press run of 700 copies.**

MAR 19 1910

