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AGENDA FOR A CRITICAL DECADE

STRATEGIC PLAN

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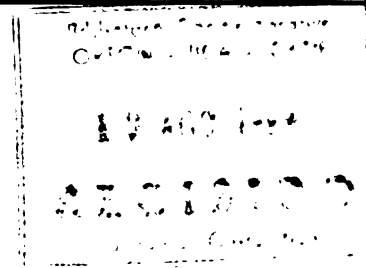
Revised Edition
1997

TROPICAL AGRICULTURAL RESEARCH AND
HIGHER EDUCATION CENTER

CATIE

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AGENDA FOR A CRITICAL DECADE



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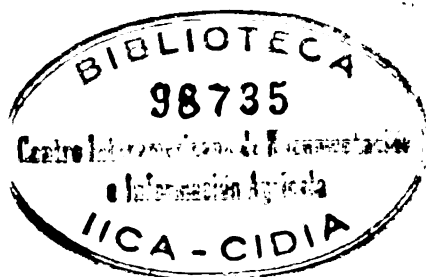
Revised Edition
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CATIE

TROPICAL AGRICULTURE RESEARCH AND HIGHER EDUCATION CENTER

Turrialba, Costa Rica, 1998

CATIE is an international, non-profit, regional, scientific and educational institution. Its main purpose is research and education in the fields of agricultural sciences and integrated natural resources management and related subjects, in the American tropics, with emphasis on Central America and the Caribbean.



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This revision was conducted through a participative process which involved inputs from the members of CATIE's Council of Ministers, the Board of Directors, Members of the National Advisory Councils (CANs), key donors, strategic allies, Program Directors and Heads of Area. Special recognition must be given to **Dr. Pedro Ferreira**, Director of Strategic Planning and External Cooperation, for his invaluable insights and efforts to coordinate this revision.

In their Tenth Ordinary Meeting, held on March 20, 1998, CATIE's Council of Ministers, under the Chairmanship of **Ing. Ricardo Garrón**, Minister of Agriculture and Livestock of Costa Rica, approved this final version of the Strategic Plan. We would like to add our special gratitude to Ing. Garrón and all of the members of the Council of Ministers, who, at all times, offered their suggestions to make the Plan reflect the priorities of the countries in the public and private sectors and especially in rural tropical American communities. Other Ministers and Vice-Ministers who provided input for this revision process were: **Luis Castro**, Vice-Minister of the Environment and Natural Resources, Venezuela; **Andrés Casco**, Under-Secretary for Planning, and **Victor Hugo Morales**, Director General for External Cooperation, Secretariat of Agriculture and Rural Development, Mexico; **Mariano Ventura**, Minister of Agriculture, Livestock and Food, Guatemala; **Ricardo Arias**, Minister of Agriculture and Livestock, Honduras; **Ricardo Quiñones** and **Vilma Calderón**, Minister and Vice-Minister, respectively, of Agriculture and Livestock, El Salvador; **Mario De Franco** and **Horacio Jarquín**, Minister and Vice-Minister, respectively, of Agriculture and Livestock, Nicaragua; **Alfonso Sandino**, Advisor to the Minister of Agriculture and Livestock, Nicaragua; **Carlos Sousa-Lennox** and **Manuel Miranda**, Minister and Vice-Minister, respectively, Ministry of Agricultural Development, Panama; **Russell García** and **Efraín Aldana**, Minister and Permanent Secretary, respectively, of Agriculture and Fisheries, Belize; and **Frank Rodríguez**, Secretary of State, of the Secretariat of Agriculture, and **Ernesto Reyna**, Environmental Advisor to the President, The Dominican Republic.

Some key members of the Regional Forum of National Authorities for Natural Resources and the Environment (FANARENA) also provided their inputs: **Gonzalo Novelo**, Director of Forest Products, INIAP, Secretariat of Natural Resources, Environment, and Fisheries, Mexico; **Juan Francisco Asturias**, National Coordinator (with Ministerial Rank) of the Environment, National Environmental Commission, Guatemala; **Roberto Stadthagen**, Minister of the Environment and Natural Resources, Nicaragua; **Sergio Zelaya**, Vice-Minister of Natural Resources and the Environment, Honduras; **Zoila González**, Director of the Environment, Dominican Republic; **Rene Castro** and **Manfred Peters**, Minister and Director for International Cooperation, respectively, of the Ministry of the Environment and Energy, Costa Rica; **Mirei Endara** and **Dimas Arcia**, Executive Director and Assistant Executive Director, respectively, INRENARE, Panama; and **Armando Vallejo**, Under-Secretary of Sustainable Development, Ministry of the Environment, Ecuador.

CATIE's Board of Directors, under the leadership of **Dr. Frank Bendaña**, analyzed the third revision of the Plan during its Twelfth, Thirteenth and Fourteenth Ordinary Meetings (April and December 1997, and April 1998). Board Members who reviewed this document were: **Iain MacGillivray**, **Irma Acosta de Fortín**, **Manoel Tourinho**, **Adrian Sommer**, **Whetten Reed**, **Gregorio Contreras**, **Roberto Ortiz**, and **Eugenia Muchnik**. This present version was finally approved on April 30, 1998.

We would also like to thank **Ing. Carlos Aquino**, Director General of IICA, and **Dr. Larry Boone**, Deputy Director General of IICA, for their continuous support and insights to CATIE's planning process.

With hopes of achieving the optimum feedback possible and obtaining the criteria of external observers, CATIE's strategy was put through a consultation process and presented by the Director of Strategic Planning and External Cooperation in various fora, including a meeting with the CCAD-AP, in Guatemala, in late 1997.

Different authorities, at various levels, in various member countries were asked to provide their government priorities. Numerous NGOs, community groups, and the private sector also provided their input to this revision, either individually or through their participation in the CAN in their respective country.

At this time, we would like to personally thank **Diógenes Cordero** (Universidad de Panama), **Joaquin Larios** (CENTA), **Jorge Morera** (BioTrop), **Alonso Matamoros**, (INBIO), **Carlos Rivas Leclair** (MARENA), **Carlos Brenes** (FTPP-FAO), **Claudio Cabrera** (National Forestry Institute, Guatemala), **Gustavo Enríquez**, IICA/Costa Rica), **William Meléndez** (MAG/Costa Rica), **Ramón Lastra** (IPGRI), **José Zaglul** (EARTH/Costa Rica), **Christoph Graf** (COSUDE/Nicaragua), high executives of the Forestry Management Division of COHDEFOR/Honduras, **Jorge Cabrera** (CCAD/Guatemala), **Keith Andrews** (Panamerican Agriculture School, Zamorano), **Mercedes Sofía Hernández** (FEDECOH/Honduras), **Lawrence Gumbiner** (Regional Environmental Center for Central American and the Caribbean, USDA/Costa Rica), and **Rolain Børel**, Swedish Management Consultant.

Special thanks are in order for **Dr. Gilberto Páez**, former Director General of CATIE, for his valuable comments and insights for the revision of this document.

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PRESENTATION

Strategic planning at CATIE is a highly participative process that takes into account points of view from governments, the private sector, NGOs, local communities, peer organizations, and international entities with regional or worldwide mandate. It also takes into account recent evaluations, either carried out externally by various donors, or by our internal process.

This Plan is therefore the product of numerous meetings and consultations that involved a great number of institutions and persons including scientists, academics, managers, executives, different strata of our clients including small producers, and people with views from developed and developing countries. The process took into account Agenda 21, and all agreements and covenants taken during or derived from the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992 (UNCED 92) as well as other accords, compromises or declarations taken by regional or sub-regional fora or summits, in tropical America.

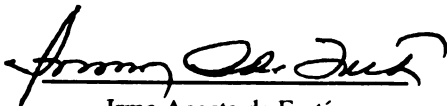
CATIE's donor support group, under the chairmanship of H.E. Gregorio Contreras (1993-1997) and Mr. Christoph Graf (1997-present), was also involved at all stages of the revision process, and their agendas and priorities were considered in this second revision of the Strategic Plan.

Therefore, strategic planning at the Center is a dynamic process, updating and adapting the Plan to the priorities set forth by the countries, for the future. The original version of the Plan was approved in 1993. A first revision was approved in 1995, and this one, the second revision, was approved in early 1998.

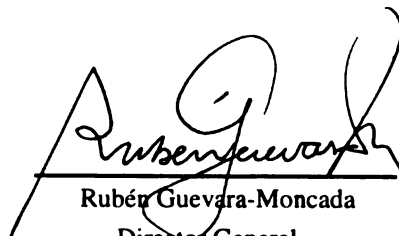
We are confident that the governments of Latin America and the Caribbean will continue to support this version of the Strategic Plan. We also trust that the international community of donors will provide financial resources to execute the Plan.

The rate of deterioration of the environment, degradation of the natural resource base, the increase in poverty, and the growing need for food of an expanding population in the American tropics, makes this last decade of the second millenium a critical one in terms of finding permanent solutions to these problems. If we do not act now, perhaps in the coming century it might be too late to reverse these trends.

With your support, participation, and ideas, we can continue to work towards our goals of better living standards for our population, and a healthier planet Earth.



Irma Acosta de Fortín
Chairman of the Board



Rubén Guevara-Moncada
Director General

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PREFACE

Throughout history, agriculture has been essential for human well-being and survival. Nevertheless, it has become one of the production sectors that most affect the environment and natural resources. Population growth has resulted in a constantly increasing demand for food, which together with an inappropriate use of natural resources, implementation of environmentally harmful production technologies, and lack of alternative employment in rural areas, has intensified the conflict between agricultural production and environmental conservation.

The challenge for resolving this conflict is to increase agricultural and forestry production while conserving natural resources and the environment. CATIE believes that these objectives constitute two distinct yet complementary and inseparable facets of the same aim.

This idea is contained within the principles of CATIE's basic strategy for the present decade. This strategy proposes concentrating resources in the Center's comparative strengths resulting in a continuous feedback among research, education and technical cooperation, and producing a synergistic effect among them.

The Center's traditions and innovative spirit can be encapsulated as follows: research and teaching must seek to *produce while conserving and conserve while producing*. Problems must be solved through local, national or regional solutions which also have global effects. Both sides of the argument are distinct and interdependent since regional demands require increased production of goods and services along with resource conservation. For this reason education and research must aim to make and keep agricultural and forestry production sustainable, and manage and use natural resources for the benefit of the local population, and society in general.

The threads of this argument have led directly to the delineation of three major programs for focusing the Center's strategies and actions. These programs are:

Research. This program aims to generate and validate technologies designed to increase agricultural productivity sustainably and to improve tropical ecosystems management. Increase and sustain agricultural productivity, preserve and enhance genetic resources, improve tropical forest and biodiversity management, contribute to the valuation of goods and services of tropical ecosystems, the evaluation of policies affecting them and all matters pertaining to gender and development, are crucial issues tackled by this program.

Education. This program aims to specialize and train human resources, providing the region with professionals educated at a graduate level (M.Sc. and Ph.D.) in the areas of agriculture, natural resource management and environmental economics and sociology. Advanced knowledge and research skills, scientific attitude,

and environmental and social awareness, are assets with which CATIE's graduates are endowed.

Outreach. This program aims to contribute to enhance the capacity of national institutions, governmental or private, dealing with higher education, research, and development in the areas of agriculture and natural resource management. It also aims to identify opportunities for cooperation and interchange, to promote CATIE's products and services, and in general, to enhance the presence of the Center at a regional level. Implementation and management of development oriented projects, training, technology transfer, networking, links with national institutes and organizations, demand analysis at a national level, provision of technical advisory services, and information management and dissemination, are elements of this program.

In summary, this strategic plan, with its emphasis on strategic research, education and outreach, strives to lay the foundations for helping society satisfy its food needs without damaging the environment and natural resources, thus improving that society's standard of living.

INTRODUCTION

The Tropical Agriculture Research and Higher Education Center (CATIE) has 55 years of experience in research, transfer, postgraduate education and training in agriculture and natural resource management in the American tropics.

INSTITUTIONAL EXPERIENCE AND STRATEGY

By means of this Strategic Plan, CATIE is concentrating its efforts in those areas which are strongest and in which it has the greatest comparative advantages. These strengths and advantages are based on the experience gained by the Center over two decades of existence and the wealth of knowledge produced during the previous three decades by the Tropical Center for Education and Research (CTEI), its predecessor, within the former Inter-American Institute for Agricultural Sciences.

The Plan is designed to provide continued reciprocal feedback, from national and international partners and stakeholders, in research, education and outreach so as to strengthen these activities and consequently, the organizations and individuals involved. This will produce viable options allowing rural families to obtain greater benefits from agriculture and natural resources while applying conservation and sustainable development criteria.

CATIE's full members are: Costa Rica and IICA (since 1973), Panama (1975), Nicaragua (1978), Honduras and Guatemala (1979), Dominican Republic (1983), El Salvador (1987), Mexico (1992), Belize (1994) and Venezuela (1996). Postgraduate education covers the whole continent.

New Directions in Response to New Demands

In 1987, CATIE approved a ten-year strategic plan covering the period 1988-1997. The document was based on a strategy of horizontal cooperation and integration between the various agricultural research, education and development institutions operating in CATIE's regional mandate. The Plan aimed to introduce the technological innovations needed to modernize regional agriculture, and thus have a positive impact on agricultural development.

Over the first four years, significant political and economic changes affected both CATIE and the region as a whole. The Center's mandate for education was extended to cover the entire American continent and, in 1991, the General Assembly of CATIE approved the creation of an independent, autonomous, and self-perpetrating Board of Directors, which is responsible for running the institution. Also, in 1992, CATIE's membership increased from seven to ten countries plus IICA, increasing the geographical area covered by a factor of three.

The Strategic Plan aims to provide continued feedback to research, education and outreach, resulting in all three activities being strengthened in a way that produces a synergistic effect.



The external evaluation recognizes CATIE's comparative advantages as its reputation, experience and knowledge in natural resources, sustainable tropical agriculture, silviculture, agroforestry and in training human resources for the American tropics.

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The region is at peace, democracy is strong, integration is advancing steadily, and there is a tendency towards diversification of responsibilities in the agricultural sector. The democratization processes increase the urgency for fighting rural poverty and ensuring food supply, thus reducing the risks of a return to armed conflict. Through privatization, formerly governmental functions are transferred to the private productive sector or to non-governmental bodies. With the opening of new markets, the private sector is taking on the leadership that was previously the exclusive territory of the public sector.

There is increased interest in regional integration as a consequence of these factors. Initiatives like NAFTA, ALCA, MERCOSUR, etc., are examples of integration, mostly to strengthen commercial interchange within and outside sub-regions. Efforts to promote sustainable development have also arisen, and might be seen as follow-ups of the Rio 1992 World Summit. ALIDES in the Central American sub-region, is a notable example of an integration agreement for sustainable development. CATIE must contribute to the above mentioned regional efforts, by preparing the necessary human resources, and by researching and disseminating technologies needed to improve the well being of the inhabitants and achieve sustainable management of natural resources.

The need then arises to *update and reshape* the Institution, its resources and strengths to face the changing socio-economic, political and institutional situation in the region, and to help the countries capture the opportunities offered by peace, democracy, integration, a more dynamic private sector, while maintaining a balance between production, conservation, and their social and sociological implications.

External Evaluations

CATIE recently underwent three external evaluations, during August 1990, November 1993, and most recently during April 1996.

The first evaluation concluded that the overall goals for the Center's programs should be *education and research in sustainable agricultural production and natural resource management and conservation*.

The evaluators found that CATIE was involved in over 40 projects of differing size and scope. These projects were designed to achieve specific goals but not to encourage institutional integration as a whole. The research programs were vulnerable because of their lack of continuity and coherence. It was concluded that the institution's tasks should be prioritized, and the development of a viable program based on the Center's comparative advantages was supported.

The second evaluation, carried out in 1993, was organized by DANIDA and SIDA, as a follow-up of a previous Nordic mission to Central America responsible for a general report on Ecology and Growth. The evaluation team arrived at the following key conclusions (a) the Master's program was seriously threatened because of lack of teaching capacity, (b) outreach capacity was limited, in particular because of the lack of permanent representations and (c) the limited number of donors, and the imminent termination of projects were putting a serious threat on institutional sustainability.

As a follow-up of this second external evaluation, an Institutional Development Plan was written to identify the strategies and activities which were necessary to bring about basic changes suggested by the Fact Finding Mission. The Plan, whose emphasis is on outreach, institutional building and financial and operational sustainability, establishes milestones for the period 1995-2002, together with impact indicators to measure the progress in its implementation.

The most recent evaluation, carried out during 1996, *found outstanding progress in CATIE's organization, financial management, financial stability, education and training.* It also found significant gains in planning ability and modest gains in the research program. In view of the Mission, CATIE's success will be determined by its ability in contributing to problem-solving research and by the demand for the research products in the countries.

The evaluation also recommended a review of the increasing priority given to forestry, agroforestry and natural resources, providing attention to resolve global problems of sustainable agriculture. *CATIE should strive to transform itself into a Center of Excellence in research, without reducing its concern for development.*

For this reason, the current Strategic Plan sets forth the activities to achieve these objectives, bearing in mind that the final goal is the improved well-being of society and, in particular, of the rural family.

The current Strategic Plan sets forth the Center's activities to achieve these objectives, bearing in mind that the final goal is the improved wellbeing of society and, in particular, of the rural family.

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SUSTAINABILITY AS A STARTING POINT FOR A NEW DEVELOPMENT PARADIGM

Efforts to define and implement actions leading to sustainability reflect concern regarding the link that exists between the potential of available natural resources and their increased demand. In theory, an ecosystem's capacity should respond to the demand imposed by people. For this reason, any discussion of sustainable development needs to reconcile biophysical aspects of water, soil, climate, recreation, fuel, raw materials and biodiversity use with social, political, economic and environmental aspects.



In this sense, the concepts proposed by the Bruntland Commission form a useful outline to re-evaluate the future, and to establish a new development paradigm: *“sustainable development attempts to satisfy current needs without compromising the ability of future generations to fulfill their own needs.”*

This concept links the important need to satisfy human aspirations with continuity and empathy for future generations. The exploitation of resources, course of investments, direction of ecological development and transformation of institutions should be in harmony, leading to an improvement in the abilities needed to satisfy the needs and aspirations of the human race. Present needs will be made relative by those of future generations.

The present generation is paying more heed to the subject of sustainability. Concern about the impossibility of maintaining consumption patterns for different social sectors is starting to dominate current thinking. This concern is based on the ample evidence available that natural resource potential is finite. Human societies cannot always replenish resources used in the production of goods and services. Genetic erosion, for example, illustrates this situation.

Sustainable development attempts to satisfy current needs without compromising the ability of future generations to fulfill their own needs.

A new social ethic and new legal parameters are needed to guide those involved, especially when dealing with external markets.

Behavior patterns must be re-evaluated. If current consumption is allowed to continue at the expense of future generations, the time scale analyzed from the point of view of finite natural resources will need a new paradigm.

The traditional focus of industrialization through import substitution and increased food production through expansion of the agricultural frontier or excessive use of chemicals must give way to the *new paradigm of sustainability, in which environmental protection, verticalization of the production process, community involvement, competition and equity form part of the model*. The opening up and liberalization of regional economies implies competitiveness, but it should avoid accelerating natural resource deterioration. At the same time, if benefits are unfairly distributed and participation is neglected, the problems of poverty and demographic pressure will further accelerate the depletion of already over-exploited resources.

Making competitive objectives and fairness compatible with sustainable development requires drastic institutional and political changes. A new social ethic and new legal parameters are needed to guide those involved, especially when dealing with external markets. It entails, in effect, the development of *a sustainable society*, with a new ethical frame of reference for those involved, so that they adopt a positive attitude and behavior patterns in keeping with the adequate use of natural resources. This is a long term goal; in the meantime there is a lack of novel technology to utilize resources along with personnel capable of implementing it. These institutional and political changes will only be possible with a better understanding of rational natural resource management, and with human resources aware of and trained to produce and implement the new proposals.

Within this context, access to information and new techniques for resource management will be essential, along with a human resources development program which incorporates these principles. With respect to liberalization and concern for growth and poverty, no development paradigm compatible with sustainability will be viable without new technology and work methods and human resources that have an innovative attitude and training. This is precisely what CATIE aims to do.

DEVELOPMENT AND CONSERVATION OF FRAGILE ECOSYSTEMS

CATIE's abilities and contributions focus on sustainability and are expressed in terms of agricultural science, natural resources management and related topics. For this reason, some of the terms inherent to this focus should be clarified.

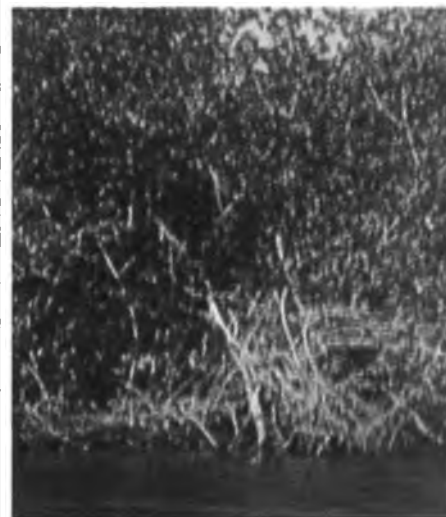
The term *ecosystem* is understood as a system or whole made up of interrelated parts and comprising both the physical environment and the organisms living in it, including humans. Tropical ecosystems can be found in coastal areas, on plains, highlands and mountains. The latter two areas include hillsides with more than 25% gradients.

From the ecological viewpoint, tropical ecosystems are restricted to a range of activities that do not provoke irreversible damage. These ecosystems become fragile when conventional production methods are used. In fact, tropical ecosystems have been poorly researched as far as productive value and potential are concerned. CATIE has management experience in the following areas: fragile ecosystems in wetlands, humid and dry natural forests, hill slopes and flat lands damaged by inappropriate resource use.

Within the context of tropical America's fragile ecosystems, *conservation* as a basis for development must inevitably consider local communities along with introduction of changes related to the production of goods and services for human consumption. The bottom line consists of recognizing the limits of human intervention so as not to cross the line separating sustainable use from inappropriate or damaging exploitation.

Conservation should, at least, guarantee the appropriate use of ecosystems so that their components and processes are altered as little as possible. The water cycle, water quality, and distribution in spatial and temporal terms should remain unaltered. Soils should not suffer erosion nor lose their physical, chemical or biological properties. Species should be allowed to remain in their habitat with the greatest possible genetic diversity. Nutrients should be preserved to provide nourishment for the ecosystem and replace those that are removed. Non-degradable contaminants or those which only degrade slowly and are harmful to living organisms, especially man, should not be introduced. The equilibrium of microorganisms to maintain nature's way should be preserved.

Conservation should, at least, guarantee the appropriate use of ecosystems, so that their components and processes are altered as little as possible.



Consequently, *sustainable development and conservation* imply five fundamental elements.

Sustainable development and conservation imply maximum sustainable use of ecosystems, a fairer distribution of benefits, participation of the local community, conservation of the ecosystems' productive capacity and the evaluation and payment of externalities.

- a. ***Maximizing Sustainable Ecosystem Use.*** This means in economic, social and environmental terms, growth and increase in the variety of goods and services available in the ecosystem, as well as an increase in total production through higher productivity while striving to maintain an adequate and permanent resource use.
- b. ***More Equitable Benefit Distribution.*** Higher incomes and a higher quality of life should be obtained from improved ecosystem use in the hope that these may reach the entire community and that indirect benefits can continue with the least deterioration possible.
- c. ***Local Community Participation.*** Local communities should participate in decision making that directly affects them so as to promote community self-management and sustainability of the options adopted.
- d. ***Conservation of Productive Capacity of Ecosystems Involved.*** The level of production reached should have characteristics of permanence.
- e. ***Valuation and Payment of Externalities.*** Methods for calculating financial yield, value and flow of services and resource valuation in general should reflect their true value. For this reason, externalities must be internalized. Environmental accounting systems must be used to calculate cost-benefit from conservation and production activities.

INTEGRATION OF RESEARCH AND EDUCATION AS A STRATEGIC APPROACH FOR SUSTAINABLE DEVELOPMENT

At the end of the twentieth century the agricultural sector is facing drastic changes, especially those related to research and technology service markets. In developing countries the rapid expansion in agricultural research that took place in the sixties and seventies has decreased considerably in the eighties. Even though the economies of our countries have been subjected to an adjustment process, no reversal of this trend is foreseen. Furthermore, during the eighties and nineties both internal investment and international aid for agricultural research decreased considerably or were reassigned.

International organizations are restructuring their research portfolios, including forestry, fisheries and natural resources along with traditional food crops and livestock. Stronger cooperation and a division of labor between national, regional and international agricultural research centers is foreseen.

The World Bank and the CG Centers have created the World Forum for Agricultural Research. However, this process has resulted in a complex coordination mechanism that is still to show results.

This situation places institutions like CATIE in a position of high priority. The Center has a unique status in Latin America, combining research in agricultural sciences and integrated natural resources management with higher education and human resources development, resulting in the optimum utilization and transfer of the knowledge and technology generated.

In a situation of scarce resources devoted to research in agriculture and natural resources, strategies to achieve an efficient and effective administration of research efforts, including cooperation and division of labour, should be carefully designed and implemented taking into account the whole regional and global context. Analysis of the global context shows that great disparities exist in the allocation of research resources. In fact, according to ISNAR:

- a. Developed countries spend twice the amount per researcher as Latin American countries (for Central America the disparity is even greater).
- b. In developed countries, about 60% of agricultural research costs are covered by private investment. In developing countries the corresponding figure is less than 10%, most of which is provided by multilateral companies that do not publish the results obtained.
- c. As to gross agricultural product, Latin American countries produce 35 times greater return on each dollar invested in agriculture than do developed countries. However, they only dedicate to these activities a quarter of the resources that are invested in developed nations, as expressed in terms of a percentage of gross product.

This situation places CATIE in a position of high priority. The Center has a unique status in Latin America, combining research in agriculture sciences and integrated natural resources management with higher education and human resources development.

There is a marked correlation between per capita investment and level of agricultural research.

- d. There is a marked correlation between per capita investment and level of agricultural research.
- e. In developed countries, public expenditure on agricultural research per person dedicated to agriculture is 86 times higher than in Latin American countries.

In fragile tropical ecosystems, increases in productivity stem directly from an increased understanding of integrated resource systems, especially those related to soils, water, biodiversity, and crop systems. For this reason, resources dedicated to systems research, emphasizing the transfer and adoption of technology and management practices should be prioritized.

CHALLENGES FACED BY THE REGION

The current decade is critical, especially in the American tropics, since concrete and timely actions must be applied today to solve the pressing environmental problems such as land degradation, deforestation and the resulting biodiversity loss while, at the same time, alleviate poverty, and its derived social problems. Tomorrow will be too late.



Failure to counteract current tendencies of soil loss, decreasing water quality and quantity, an ensured food supply, loss of flora and fauna diversity, will have unforeseen consequences for future generations. Today's deterioration of resources and quality of life in local communities is just a forewarning for the future. In order to identify CATIE's role and proposed strategies more clearly, it is important to analyze the dynamics of the situation. Key elements justifying CATIE's strategy are presented in this document.

THE PRESENT REGIONAL AND GLOBAL FRAMEWORK

The end of the twentieth century has been characterized by the globalization of the economy, an end of ideological confrontation, and accelerated land deterioration.

Significant technological advances in communications and transportation have resulted in the development of an economy that is increasingly global in character, characterized by interconnected stock markets, increased commerce between blocs of countries and the creation of immense financial and foreign exchange markets. Suffice to say that annual financial transactions are four times greater than transactions in goods and services.

The end of the twentieth century has been characterized by the globalization of the economy, an end of ideological confrontation, and accelerated land deterioration.

CATIE's member countries are adopting a new form of growth, economically speaking.

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The end of the ideological confrontation is extremely important for CATIE's member countries, since it allows the definition of a new basis for international relations. These are gradually changing from an ideological alignment to commercial and environmental interests. The tapering off of financial aid to countries in Central America attests to this.

The Earth's biodiversity is exposed not only to natural disasters, but also to over-exploitation of its resources by human societies. The disturbing effects of environmental pollution and the deterioration of water, soil, flora and fauna are common concerns.

There is still hope, however. This is demonstrated by the efforts made by international and national institutions, NGO's and others, and in particular by the agreements and resolutions taken at the 1992 Rio Conference, notably Agenda 21 and the Biodiversity, Global Climate Change, Ocean Waters and non-binding Forest Principles, and the resolutions from the recent 1997 follow-up Conference Rio+5. Other initiatives such as those related to certification, criteria and indicators for development, and environmental accounting add to the efforts to build a sustainable society.

Problems that attract worldwide attention such as global warming caused by carbon dioxide, nitrogen oxides and other emissions; pollution of soil, fresh water, oceans and the air; accelerating deforestation; and thinning of the ozone layer are results of uncontrolled development.

CATIE's member countries, in particular, are adopting a new form of growth, economically speaking. This is characterized by structural adjustment, economic stabilization, or opening up of commerce to stimulate international economics and a dismantling of protectionism. In politics, along with the progress in the peace process and the installation of democratic regimes, there is a noticeable tendency towards integration resulting in increased competition. This is an indispensable prerequisite for inclusion in the international arena.

Integration efforts have also been initiated in the area of technical and scientific cooperation in Latin America and the Caribbean. FANARENA (Forum of National Authorities in Natural Resources and the Environment), the Procis (PROCISUR, PROCIANDINO, PROCITROPICOS and PROCICARIBE), the CCAD (Central American Commission for Environment and Development), the SICTA (Central American System for Agricultural Technology Integration), the IDB's Regional Fund for Agricultural Technology, etc., are successful examples of integration mechanisms. In this context, CATIE is playing an important role in supporting these processes, which contribute to effective coordination in the field of agrosilvopastoral technology generation and transference, and academic cooperation.

SOCIOECONOMIC AND ENVIRONMENTAL CHALLENGES

Continued Population Growth

One of the most important problems facing Latin American countries is population growth and increased poverty, especially in rural areas. This problem, which is closely linked to natural resource degradation, aggravates the exodus to urban centers with a subsequent deterioration in standards of living. The population in CATIE's mandate region is growing rapidly at an annual rate of 2.9%. It is estimated that the population of Central America will grow from its present 1997 level of 35 million to 63 million by the year 2020. This growth implies a need for improved production of agricultural and forest products to satisfy the demand for consumer goods. Urban expansion calls for the additional need to increase the productivity of the agricultural and forestry labor force and resources used in the production process.

Worsening Rural Poverty

CATIE's member countries have not escaped the American continent's tendency towards increased poverty levels. By the end of 1995 about 210 million inhabitants of Latin America and the Caribbean were classified as poor by CEPAL. Only a minimum trend downwards (from 41% to 39%) in the percentage of households which were classified as poor (CEPAL 1997), was observed during the first half of the 1990's.

Sixty five percent of the region's poor are rural inhabitants. There is a tendency for migration to urban areas which has a negative impact on the quality of life, cost of services and environmental pollution, since there is an inadequate infrastructure for waste collection and treatment. Of those who stay in the country, a large proportion practice subsistence agriculture which conflicts with the environment. The growing population of poor people is of concern to CATIE since it is at the root of natural resource and environmental deterioration in the tropics. This growth increases pressure on renewable natural resources and marginal lands as inhabitants attempt to eke out an existence.

Deterioration of Land Resources

Current land availability does not correspond to the needs and demands of the people. Lacking access to flat land, less resource-endowed rural inhabitants migrate to urban centers or put pressure on fragile ecosystems and exploit them. Paradoxically, however, under current use, less than 23% of tropical soils can support agricultural activity without causing greater damage to the ecosystem. It is estimated that in Central America alone, more than 70% of the population lives on hillsides.

In Central America, more than 20% of the useful soil has been lost in the past 25 years. In some parts of Central America and Mexico, erosion rates have reached over 200 metric tons per hectare per year.

The growing population of poor people is of concern to CATIE since it is at the root of natural resource and environmental deterioration in the tropics.

The intensification of agriculture has negative repercussions on human communities, the environment and production costs.

Deforestation in the region is characterized by a growing biodiversity loss and inefficient utilization of forest, mainly evinced by the utilization of only a few species and a lack of awareness of secondary or non-timber products.

Intensification of agriculture

The intensification of agricultural production has had an effect on the type and degree of modification of ecosystems. Exploitation systems designed to maximize short-term production, ignoring any deterioration caused by indiscriminate utilization of resources, give rise to unstable agroecosystems subject to high input use.

At the same time, the introduction of high input technologies in traditional production systems distort them, making them unstable and causing degradation and accelerated deterioration of resources. For both systems, breakdown of the tropic levels and lack of stability caused by the absence of natural controls has required increasing applications of agrochemicals. This situation has negative repercussions on human communities, the environment and production costs.

The technological challenge consists of increasing productivity and achieving sustainable exploitation in ecologically fragile areas, while reducing the existing gap between available technology and that employed by end users.

Technological and production levels

Low levels of technology predominate in the American tropics. Growth rates for agricultural production since 1980 and decreasing growth rates for food production confirm the impression of general stagnation in agriculture. On the average, agricultural growth rates during the 1980's were lower than population growth, a situation which directly affects the security of the food supply.

A high level of insecurity regarding the food supply and resulting dependence on imported foodstuffs has a negative impact on people's nutrition, balance of payments and external debt.

DEFORESTATION AND RELATED PROBLEMS.

As a result of rural poverty and population growth, the most striking ecological change in the American tropics has been the rapid and continued conversion of natural forests to alternative land use.

Deforestation in the region is characterized by a growing biodiversity loss and inefficient utilization of forest, mainly evinced by the utilization of only a few species and a lack of awareness of secondary or non-timber products. There are no reliable statistics on this matter, but the right parameters are present to infer that the genetic diversity of species is getting worse (at best), and that more, and more species are endangered or threatened by their habitat losses.

Deforestation is caused as much by expansion of the agricultural frontier for growing crops and exploiting trees for fuelwood and timber as by the expansion of pasture. It has direct negative effects on soil erosion and soil fertility, causes hydrological changes resulting in sedimentation and flooding in low lying areas, alters coastal ecosystems, pollutes sources of water for human consumption and reduces available oxygen, thus affecting aquatic flora and fauna. Inadequate reforestation and poor management of natural regeneration only worsen the situation.

Closely related to the deforestation problem is that of water quality and quantity, which are getting worse over time. In many communities water has become the most important natural resource for the daily lives of people, and for the production of agricultural and industrial products. Additionally, water in most cities and in rural areas is contaminated by agricultural or industrial chemicals, which will affect public health.

HUMAN RESOURCES

Competitiveness is one of the central aspects of the new development paradigm. In a world characterized by a virtual national autarchy, delayed communications and immobility of resources, most comparative advantages have been gained from the abundance of natural resources and cheap labor. However, technological developments have caused the static concept of comparative advantage to evolve into one of competitive advantage. This means that a country's competitive ability depends not only on its natural wealth of resources but also on its ability to integrate its production into international markets, its scope for adopting new technology and ability to quickly adapt to changes in demand or technology. This new situation calls for a suitably trained workforce.

For this reason, CATIE's member countries are falling behind in terms of human resources. The kind of training necessary to meet these new demands has not been developed in the Iberoamerican region.

Personnel with agricultural sciences and natural resource training have little field experience and do not possess up-to-date information on sustainability and equity. Production obligations are met with technological packages dating from the green revolution rather than sustainable development through conservation.

Research tasks are not given enough cultural value. In this context, there is a pressing need to train human resources for the new development paradigm. This training must include management training, technical education and field experience to meet the demands for greater productivity and renewable natural resource management with up-to-date skills. There must be an understanding of research methods and techniques together with a pragmatic attitude towards the social and institutional tasks that must be developed.

Figure 1 summarizes the problems that have been presented regarding renewable natural resources, their causes and consequences for tropical America.

Technological developments have caused the static concept of comparative advantage to evolve into one of competitive advantage.

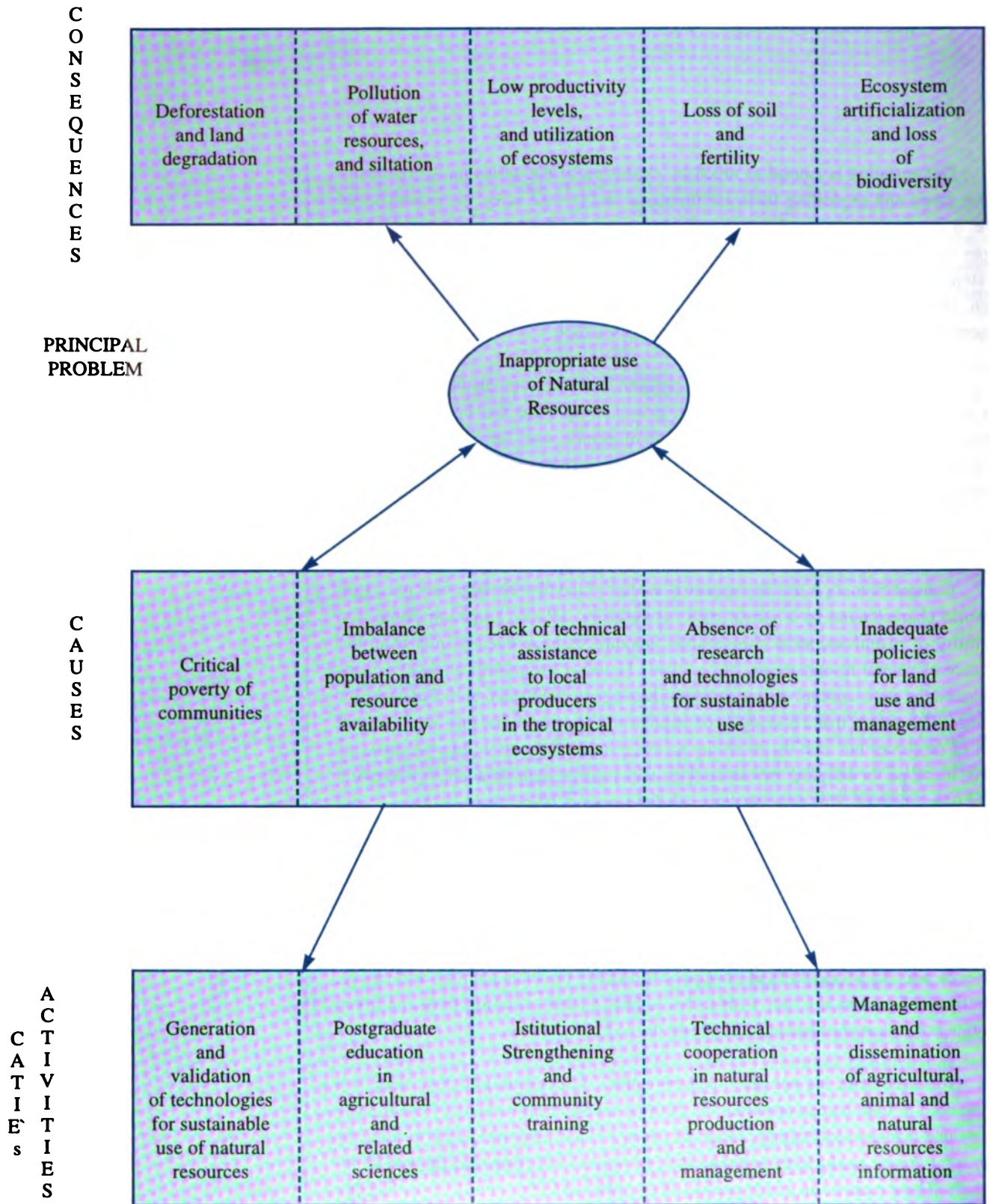


Figure 1. Nature of the problem and CATIE's priorities for action.

CATIE: MEETING ITS OBLIGATIONS AND MANDATE

CATIE'S MANDATE, MISSION AND VISION

The Center's mandate was established in Chapter 1, Clause 1 of the Constitutional Contract approved by the Inter-American Board of Agriculture (IABA). It states that CATIE is a civil association, with power of attorney, whose aim is to conduct research and postgraduate education in agricultural sciences and natural resource management to benefit the countries, and the populations of the Americas.

Within the framework of this mandate, CATIE's vision and mission are:

VISION

The countries of Tropical America are using and implementing practices for sustainable development, reconciling production and conservation in tropical ecosystems, and enhancing the socio-economic well being of the population.

MISSION

To improve the well being of humankind by applying scientific research and higher education to the development, conservation and sustainable use of natural resources in the American tropics.

CATIE's mission considers research as a basic tool that will enable the institution to contribute towards development, and to the well-being of humanity, through understanding of environmental and socio-economic processes. The product of research is information, concerning technologies and policies, in the areas of agriculture, natural resource management and the environmental aspects of those two areas. Of utmost importance, enhancement of human resources through higher education and training, and dissemination of information for institutional strengthening are the necessary complements of the Center's research activities which enable it to attain impact at the field level.

CATIE is aware that its future activities must be concentrated in fewer areas but with greater depth and continuity. The Center also recognizes that its mandate requires it to answer a great number of questions, but that its action will address a few-chosen (high priority) fields and only cover tropical America in such areas as forest management, biodiversity conservation and production systems. In addition,

the synergistic effect of research-education-transfer will be emphasized to allow continued efforts in research both at the Masters and Doctorate level, and through the work of CATIE's scientists/professors.

Special attention is given to the needs of resource-limited farmers, including female, indigenous, marginal land and natural forest dwellers. The enhanced management of agro-ecosystems, the analysis of socio-environmental interactions, and the valuation of natural resources are an integral part of its working scope.

The criteria which support CATIE's vision and mission, and the above established goals for the year 2020 are:

1. Urgency Decision makers, stakeholders and society in member countries, and the international community, have expressed an urgent need and demand for action.

2. Economy of efforts. Collaboration with national, regional and international institutions and organizations, both public and private, will minimize duplication of efforts and increase the effectiveness of actions.

3. Institutional advantage. Programs will focus on a few, well prioritized areas of excellence, specially on those where a significant concentration of accumulated knowledge, human expertise, tradition, and strengths, provide a comparative advantage to the Center.

4. Institutional sustainability. Short, mid-, and long-term actions should be based on secure and stable financial resources. Fund-generating, fund-raising, and endowed funds will be sought constantly.

The Center's activities are concentrated in three main programs, namely:

I. Research,

II. Education for Development and Conservation, and

III. Outreach.

- Through research, CATIE seeks to generate and validate technological practices for agricultural production and natural resources management, which are economically feasible, socially and culturally acceptable and environmentally sustainable.
- Through higher education, the Center prepares professionals at a postgraduate level to contribute to the development of knowledge and execution of programs conducive to the appropriate management of natural resources, and to the solution of the socio-economic and agro-ecological problems in tropical America.
- Through outreach, CATIE seeks to contribute to the improvement of national research, education and development capacities, and to enhance the Center's presence in the region. Information management and dissemination, validation and demonstration of natural resources management practices, and training and conferences, are crucial components of outreach.

CATIE's strategy considers working in close cooperation with national institutions, to attain an impact at the field level (Figure 2). Institutional beneficiaries include end users as well as private and public institutions.

Through research, education and outreach, CATIE seeks to generate and validate technological practices, prepare professionals at a postgraduate level, and contribute to the improvement of national research, education and development capacities in the region.

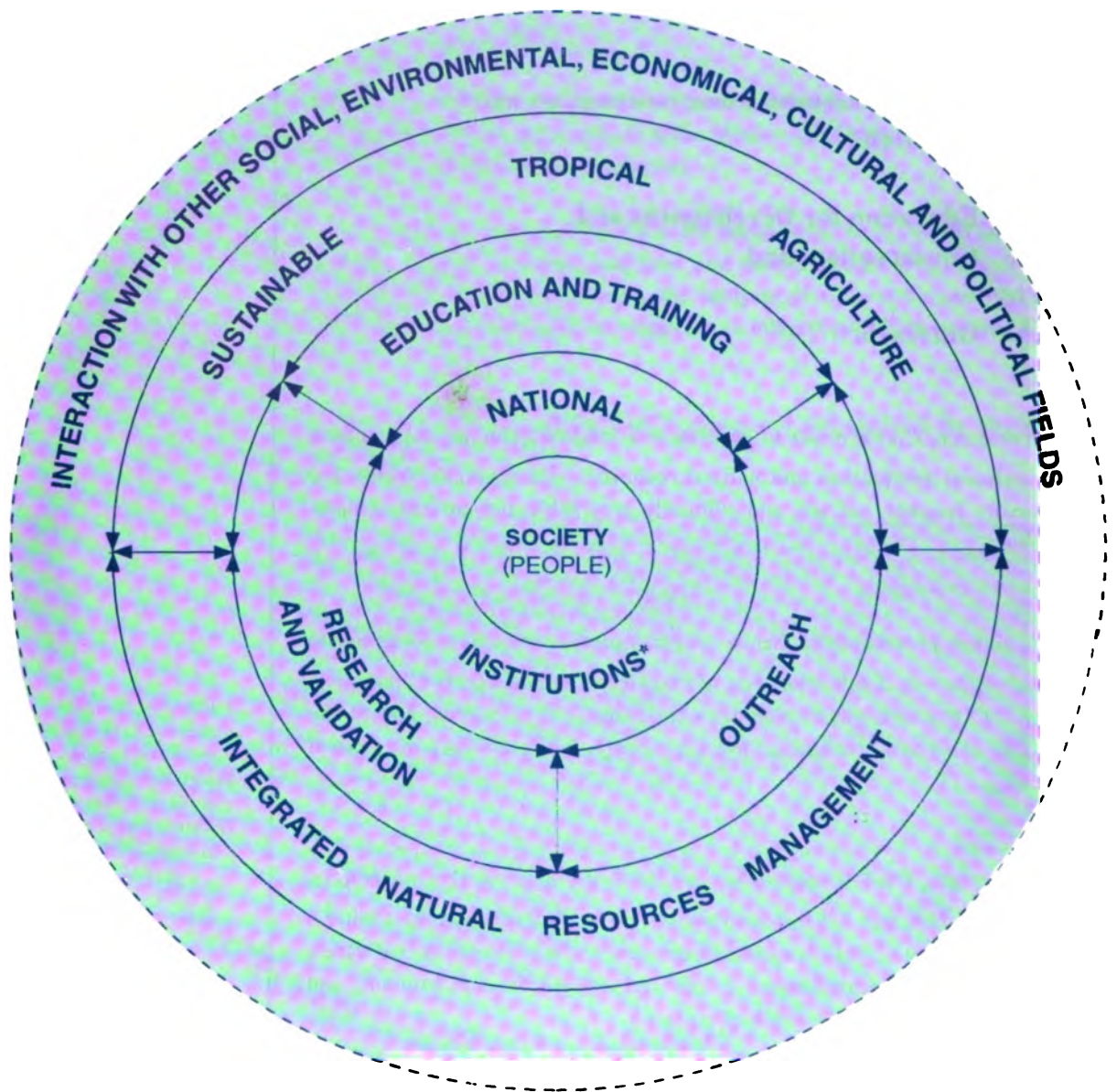


Figure. 2 Focus of CATIE's activities during the last decade of the millennium and thereafter.

CATIE's PROGRAMS

To carry out its objectives, CATIE is organized in three main programs: Research, Education and Outreach. They form an interconnected triangle with synergistic effects. Technology generation and validation, higher education, and outreach through training, information dissemination and transference, are the respective endeavors of the three programs.

CATIE's research, education and outreach efforts will have, by the year 2020, contributed towards

- alleviating poverty, in particular by improving the management of fragile land ecosystems.
- improving the diversified management of forests and the valuation of their environmental products and services.
- reversing land degradation, particularly soil erosion and depletion in hill-side and frontier forest lands.
- reducing the use of pesticides, in particular through their replacement with biological control agents and/or improved agronomical techniques.
- making agroforestry a widely used tool to improve and sustain production, enhance environmental conservation and alleviate poverty.
- improving and conserving germplasm of selected crops and forest species
- modernizing higher education and research through the use of electronic media, telematics and the development of regional information systems.

Poverty alleviation, reversed land degradation, reduced pesticide use, improved germplasm conservation, and modernized higher education and research through the use of electronic media, among others, are the overall objectives of CATIE's Research, Education and Outreach Programs.

RESEARCH PROGRAM

The Research Program addresses the need for greater productivity, and thus increased agricultural and forest production, along with a commitment to sustainability, i.e. the sustainable management and conservation of tropical ecosystems, and social, environmental and economic implications. It is justified by increased demand for food and services by a growing population, as well as by the need for solutions to the rapid and continued conversion of natural forests to other uses, loss of biodiversity and poverty. Its mission is to mitigate socioeconomic needs, particularly those of marginal communities, which impact upon fragile ecosystems in tropical America, and to contribute to environmental conservation. It also aims to contribute to reversing environmental degradation, add value to tropical ecosystems through the scientific valuation of all its products and services, and enhance

Through its five Research Lines, CATIE strives to contribute to the well-being of the inhabitants of the tropics.

competitiveness of the agricultural and natural resources sectors in order to face the challenge of globalization.

The Program's objective is:

To contribute to the well-being of the inhabitants of the tropics through the generation and validation of technological practices for agricultural production and natural resources management, which are economically feasible, socially and culturally acceptable, and environmentally sustainable.



Specifically, CATIE's Research Program aims at producing:

- Increased knowledge on biophysical, ecological and socio-economic mechanisms and dynamics of production systems and their components.
- Improved technologies and management systems for integrated sustainable agriculture and management and conservation of natural resources.
- Information, scenarios, and options for sustainable development based on agriculture and conservation and management of natural resources.

The Program concentrates its efforts in five research lines which have been identified through a participative process as having high priority in the region, are the following:

CATIE

Research Lines

- Line 1.** Germplasm improvement and conservation of selected agricultural crops and forest species.
- Line 2.** Agroforestry and forestry integrated pest management.
- Line 3.** Tropical agroforestry systems for hillsides, frontier and degraded lands.
- Line 4.** Development of technologies for the sustainable management of forests and their biodiversity.
- Line 5.** Socio-economic analysis and valuation of policies, and the environmental goods and services of tropical ecosystems.

The activities in each research line are carried out by an interdisciplinary research team lead by a senior scientist. Linkages with member countries and feedback mechanisms for research and validation are considered of crucial importance. Collaborative efforts with advanced Latin American, North American, European, regional and international organizations will be fostered, including joint execution of research projects, interchange of researchers and postgraduate students, etc.

Research at the Graduate School, which is carried out mainly by Ph.D. and M.Sc. students, is fully integrated within the efforts of the research teams of the institution. In particular, the Ph.D. program plays a crucial role in contributing to those efforts. The dissemination of research results is carried out in collaboration with the Outreach Program, with emphasis being given to synthesis reports, GIS-based databases, information systems accessible through Internet, and institutional networks.

An internal Research Committee consisting of CATIE's leading scientists will be established. It will constantly monitor and feed the activities of planning, management, evaluation and impact assessment of research in CATIE.

Germplasm improvement and conservation will be a component that safeguards conservation and supports agricultural and forestry development in the member countries.

Research Line 1

Germplasm Improvement and Conservation of Selected Agricultural Crops and Forest Species

Phytogenetic resources are an indispensable tool for human survival. Replacement of local varieties by more homogeneous cultivars, exploitation of new areas for growing crops, urban development, together with changes in cropping techniques, have resulted in an accelerated and profound genetic erosion of crop species and wild relatives with possible potential use.

Under the current Strategic Plan, *Germplasm improvement and conservation will be a component that safeguards conservation and supports agricultural and forestry development in the member countries.* CATIE will, therefore, enhance and conserve the Phytogenetic resources of economic importance and introduce valuable genotypes that are important for regional agriculture.

The objective of this research line is to increase, preserve, characterize, document and make available to users the genetic diversity of agricultural crop and forest species of actual or potential use.

Two major characterization programs using biotechnology tools are emphasized. The first is devoted to coffee, and aims at the selection, from the field collection, of the most interesting varieties in terms of disease resistance. The second program's objective is the characterization of the diversity of forestry species of



economic importance in the region. Other species also undergo diversity studies with molecular markers.

Conservation is also supported by biotechnology tools. One of those tools, *in vitro* conservation of micro-cuttings or buds, is being used, for example, to duplicate INIBAP's international banana and plantain collection. Coffee and root and tuber genetic resources are also conserved in this manner. A second tool, long-term conservation of materials in liquid nitrogen is used to preserve cellular suspensions from various species.

Efficient micro-propagation techniques and cellular regeneration systems for genetic transformation are prioritized. Likewise, *in vitro* multiplication techniques for fruit trees, such as Sapotaceas, is used to support conservation and diffusion of these materials at the regional level. Multiplication through the budding or somatic embryogenesis techniques is used for mass multiplication and diffusion of selected or improved material, exchange of plant material and cellular regeneration for non-conventional genetic improvement programs.

In the specific case of forest germplasm, CATIE recognizes the importance of providing appropriate seed sources. The characterization and conservation of forest genetic resources, as a prime need for their improvement and use in the short, medium and long term, is promoted. The goal is the identification and selection of superior genotypes, through provenance trials, progeny trials and clonal selection. Research priorities include the improvement and conservation of forest genetic resources and the establishment and management of seed sources for the collection, storage and promotion of high quality forest seeds..

Cooperation with prestigious institutes and organizations such as CIRAD, ORSTOM, IPGRI, INIBAP, ACRI, etc., strengthens the activities related to this research line. Networking through PROMECAFE, REMERFI, etc. is also considered as an important mechanism to enhance research and germplasm interchange in the region.

Four sub-lines of research have been identified:

- Characterization,
- Conservation,
- Propagation, and
- Genetic Improvement.

Research Line 2

Agroforestry and Forestry Integrated Pest Management

Agricultural pest management (including insects, pathogens, nematodes, weeds, rodents and birds) is currently characterized by the predominance of chemical control methods, of which the most common are synthetic pesticides. The use of these pesticides is generally unsatisfactory, because of the many problems they cause. These include conversion of secondary pests in primary pests, development of resistant strains, reduction in the population of beneficial insects, wildlife mortality, degradation of the productive capacity of soils, acute work-related poisonings, chronic poisonings of consumers through water contamination and residues in food, and economic losses due to unnecessarily high production costs or rejection of export crops contaminated by pesticide residues.



CATIE is a pioneer in the search for solutions to these problems, especially in biological control and cultural practices.

CATIE is a pioneer in the search for solutions to these problems, especially in biological control and cultural practices. It is continually developing pest management options which maintain satisfactory profit margins for producers while eliminating or reducing the undesirable agroecological, environmental, economic and social impacts.

This research line has as general objective the reduction of pesticide use through promotion of ecologically oriented alternatives, and the reduction of losses due to pests.

Three sub-lines of research have been identified:

- Pest and biological control agents inventory in agroforestry and forestry systems.
- Agricultural practices, biological control and decision criteria for IPM in agroforestry and forestry systems.
- Methodologies for the implementation of IPM at a farm level.

These are related to three major objectives which are emphasized. The first is devoted to generate, develop and test bio-intensive IPM technology inputs for use in target production systems. The second objective is to provide pest-related research-based support services to internal and external users in the fields of agroforestry, plantation forestry and natural forest management, including pest identification and phytosanitary characterization. The third objective is to generate knowledge on how to effectively mass implement IPM in target agroforestry systems, and how to enhance producers' pest management decision-making capability.

Research Line 3

Tropical Agroforestry Systems for Hillsides, Frontier and Degraded Lands

CATIE is a pioneer in the field of agroforestry systems at a worldwide level. Agroforestry systems consist of at least two plant species, of which one is a perennial tree and the other an annual or perennial crop used for human consumption or animal fodder, or with industrial importance. They have great potential for contributing to production sustainability and conservation of natural resources, and thus to the well-being of the rural population in tropical America.

The Center is also well known for its contributions in the area of watershed management in the Central American region. Inappropriate land use in watersheds creates serious social and economic costs and threatens agriculture, sources of drinking water, natural runoff control, navigation and tourism. Reforestation, agroforestry, and sound agronomic and conservation practices, together with appropriate land use planning, are emphasized to solve the problem.

This research line emphasizes the improvement of agrosilvicultural, silvopastoral and agrosilvopastoral systems for small and medium producers. It focuses on the bio-physical and socio-economic evaluation of these systems and the

This research line emphasizes the improvement of agrosilvicultural, silvopastoral and agrosilvopastoral systems for small and medium producers.



selection of the tree components. Particular attention is given to the study of the interactions between the components (crops, trees, pasture, light, nutrients, macro and micro-fauna, cattle and soils) and the users. Soil-crop-tree-human and soil-pasture-tree-animal-human interactions are especially important for this line of work.

Three sub-lines of research have been identified for agroforestry systems (AFS) research :

- AFS for the production of annual crops in humid hillsides,
- AFS for perennial crops,
- Silvopastoral systems for degraded pasture lands in the humid tropics

Existing “traditional” agroforestry systems (coffee with shade, Taungya and silvopastoral systems) and recently developed systems (alley cropping and live barrier systems with annual food crops, living stake systems), and in particular the ecological and socio-economic issues, are main research targets.

Close relationships are maintained with a network of institutions in the region such as the national coffee institutes, and with international allies such as ICRAF, North American universities (Laval, Florida, Alberta) and German universities (Bayreuth, Hohenheim, Göttingen).

Research Line 4

Development of Technologies for the Sustainable Management of Forests and Biodiversity

Over the past 50 years, CATIE has acquired a clear leadership in *tropical forest management, plantation silviculture and management and conservation of biodiversity*. Besides providing benefits to society, the adoption of forest management practices for diversified production will contribute to a marked improvement of the family economies of farmers living in the frontier zone, and organized to work at a family or community level, as recent studies have shown.

The biodiversity of the American tropics is, at best, under-utilized and, generally speaking, not managed. Most botanical studies made in the tropics have been strictly scientific, limited to taxonomic descriptions of new species, biotypes or ecotypes and studies of a preliminary diagnostic nature, and insufficient for establishing guidelines for biodiversity utilization. These have rarely been complemented by the ethnobotanical or economic botany studies which would be needed for developing appropriate management of biodiversity products.

The strategic purpose of this research line is to develop options for forest and biodiversity management systems that are ecologically sustainable, economically attractive, socially acceptable and can be applied to different types of forests. Particular emphasis is given to current issues in tropical forestry research such as timber certification, carbon sequestration, reforestation of degraded areas, biodiversity conservation in neotropical moist forest lands, criteria and indicators of sustainable forest management, and diversified forest management options.

Besides providing benefits to society, the adoption of forest management practices for diversified production will contribute to a marked improvement of the family economies.



The following research sublines have been defined

- Development of technologies for natural forest management
- Management and conservation of biodiversity
- Plantation management and silviculture

The first subline intends to develop strategies and technologies that contribute to the sustainable diversified management of neotropical moist forests, through the determination and modeling of the impact of different internal and external factors on the dynamics of the society-forest system. The approach is integrated and cross-disciplinary. Work is done simultaneously on biophysical, technical, social, organizational, financial and economic aspects of forest management, in the same forests, at selected study sites called *Key Sites*.

•The general objective of the second research subline, i.e. management and conservation of biodiversity, is to contribute to the scientifically-based conservation of biodiversity in neotropical moist forest lands, through the determination and modeling of the medium and long-term effects of management for timber production and composition, species richness and diversity (*the floristic parameters*) of mature forests, and of spatial and temporal trends in the floristic parameters of secondary forests, at sites in at least two different Holdridge life zones and two general biogeographical regions.

The third research subline, i.e. plantation management and silviculture, aims to further develop CATIE's research tradition in multiple-use tree silviculture. An analysis of the problem of natural forest destruction and demand for forest products in Central America has revealed an increasing need for timber, fuelwood, forage and poles, among others. For this reason, silviculture and socioeconomic research, conducted in demonstration areas with different fragile conditions in member countries, are crucial components of CATIE's research strategy.

Research Line 5

Socio-Economic analysis and valuation of policies, management and the environmental goods and services of tropical ecosystems

This line of research intends to contribute to the understanding of the institutional economic, social, and managerial factors which affect natural resource management as a basis for production.

The importance of agriculture and natural resources in the economies of American countries makes them a linchpin for sustainable development. Consequently, *development must follow an integrated approach* so that technological aspects are not incompatible with or become offset by economic, social, cultural, institutional or managerial limitations. This research line analyzes the *conditioning effect* of these factors on sustainable development as well as the need to incorporate them into *technology generation and transfer*.

This research line analyzes the conditioning effect of these factors on sustainable development as well as the need to incorporate them into technology generation and transfer.



The following sublines of research are addressed:

- Economic valuation and analysis of goods and services from tropical ecosystems,
- Socio-economic evaluation of policies affecting the utilization and management of tropical ecosystems, and

- Socio-economic analysis of the processes of technological change occurring in tropical ecosystems.

Emerging themes such as carbon dioxide sequestration *vis a vis* forest management and plantations, the value of non-wood products such as water, oxygen, biodiversity and recreation, will be considered, and research will be conducted to generate basic information and identify mechanisms to make the principle “the polluter pays” a reality. This includes studies on environmental accounting, in reference to resource planning and use patterns.

The policy environment that influences tropical ecosystem management, and the adoption of technical innovations, is considered a key element when devising development and resource management strategies. Research in these subjects leads to knowledge of obvious interest to policy and opinion makers, research and development administrators, and to the donor community, among others.

EDUCATION FOR DEVELOPMENT AND CONSERVATION PROGRAM

The development and promotion of technological options and practices appropriate for tropical ecosystem use faces the problem of a lack of human resources with the necessary abilities and knowledge to conduct research, education and strategic management for sustainable development and conservation of fragile ecosystems. The program will work closely with the Research and the Outreach program of the institution.

The Program’s objective is:

To develop human resources, at the postgraduate level, with the necessary attitudes, abilities and knowledge to perform research and promote and implement sustainable natural resource management and conservation in the American tropics.

Sustainable agriculture and natural resource management and conservation call for suitably qualified staff and decision makers. There is a pressing need to train professionals within the bounds of the new development paradigm. CATIE is meeting this challenge and heeding the new demands of the American tropics in a way that is unequaled.

Through its Masters and Doctoral Programs, CATIE strives to develop human resources with the necessary attitudes, abilities and knowledge to perform research and promote and implement sustainable natural resource management and conservation in the American tropics.

CATIE

The Center has fulfilled its continental mandate through 53 years of uninterrupted postgraduate education. Over 1500 students have graduated (1997 data) and are currently working in research, education and management in agriculture and natural resource sciences throughout the Americas, as well as occupying high level positions in a wide range of national and international Institutions. During this time, the Center has gained the experience necessary for educational administration, development and validation of teaching and learning methodologies and development of curricula suited to the needs of tropical America. Teaching facilities and laboratories are enhanced by the Orton Memorial Library housing the most extensive collection of works on agriculture and natural sciences in Latin America and the Caribbean. The innovative spirit which characterizes the Center is reflected in the teaching and learning environment. The Postgraduate School is located in the humid tropics and boasts a teaching and research staff with ample international experience who receive technical assistance in the Center's member countries. Because of their varied backgrounds, members of the teaching staff have a wealth of different cultural experiences along with access to all the information and data produced by the Center and other institutions. This diversity guarantees a free exchange and renewal of methodologies, ideas and achievements in the fields of agriculture and natural resources to all CATIE members, without losing sight of conditions that prevail in each of the countries.



The teaching program, which now offers graduate education opportunities at a M.Sc. and Ph.D. level, is periodically subjected to curricular development exercises to ensure that it is up-to-date and state of the art in all its areas of specialization. The development process has also paid particular attention to ensuring that the research and education programs are in complete correspondence and fully integrated.

Interdependence, feedback and coherence of institutional activities is of utmost importance. As an example of this, all these are immersed within the institutional research lines, and all scholarship students are named Research Assistants to CATIE's education faculty.

Magister Scientiae Degree

Magister Scientiae degrees will continue to be offered in: a) Management and Conservation of Tropical Forests and Biodiversity, with emphasis in Management of Diversified Forest Production Systems, and Management and Conservation of Biodiversity; b) Tropical Ecological Agriculture, with emphasis in Organic Agriculture, Plant Protection and Biotechnology; c) Environmental Economy, with emphasis in Environmental Management and Environmental Socioeconomics; and d) Tropical Agroforestry Systems.

Research topics for each of these emphases coincide with those of CATIE's Research Lines. The students are integrated within the research teams of the different technical Areas of the institution as Research Assistants, and their research skills are enhanced through close cooperation within priority research projects.

The M.Sc. program emphasizes the transformation of minds through learning and scientific research training. Emphasis is on the formation of human resources, the attainment of intellectual maturity, the fostering of creativity, entrepreneurship and independent thinking, the final goal being the launching of a lifetime of intellectual growth in each graduate.

Alumni leave the Center with the scientific, managerial and field skills to successfully meet the demands for increased production and sustainable natural resource management in tropical America. Their knowledge of and proficiency in current research and methods, leadership skills, and positive attitude towards the tasks that must be undertaken all ensure they will carry with them the innovative spirit that characterizes their "Alma Mater".

CATIE is also planning to offer new Professional Masters (M.P.) degrees in several fields in consortia with well known universities in the region and in developed countries. Professional programs do not have an emphasis in research training, but aim to provide knowledge, social and environmental awareness, and technical and managerial skills, through study and practice, including in-service training. They induce the critical and innovative thinking, and leadership attitudes which are crucial for the modern professional of the 21st century.

The M.Sc. program emphasizes the transformation of minds through learning and scientific research training.

Ph.D. Degree

The Doctorate Program will continue to offer the Ph.D. degree, which is the highest academic degree offered by the Center. Those who earn it must demonstrate significant intellectual achievement, great breadth of knowledge and ability to perform independent, original and significant research.

CATIE offers Ph.D. degrees in Tropical Forest Sciences, Tropical Agroforestry Sciences and Tropical Ecological Agriculture. The Ph.D. Programs last a minimum of three years. The first year is devoted mainly to course work and the following two years emphasize research work. Both programs are cooperative programs jointly organized with well-known American and European universities. Normally most of the course work is done at the cooperating institution and most of the research work is done at CATIE, with field work anywhere in tropical America.

Ph.D. research subjects should be included within CATIE's research lines.

Exchange of Students and Scholars

The program will administer a continuous influx of graduate students (M.Sc., Ph.D., Dr.Sc.) coming from well-known universities in the U.S., Canada, Europe and to a lesser extent from Latin America and the Caribbean, mainly to perform thesis research. The program encourages the interchange of Ph.D. students, post-docs and visiting professors interested in spending periods of time at CATIE for research or academic purposes.

Scientific and academic interchange will be fostered as a mechanism to transfer knowledge, train human resources, and strengthen the Center's research and academic programs.

OUTREACH PROGRAM

In the mid 1990s CATIE's main stakeholders concluded that insufficient dissemination of information and technologies was severely limiting progress in agricultural and forest production and in the conservation of natural resources, therefore hampering the alleviation of poverty and, hence, social development and economic growth. They urged the Center to take action, and CATIE decided, in 1995, to establish a full-fledged Outreach Program that should complement its Research and Education Programs.

CATIE also recognized the need to cultivate the support of its stakeholders and their constituencies much more systematically. This responsibility was added to the new program.

CATIE offers Ph.D. degrees in Tropical Forest Sciences, Tropical Agroforestry Sciences and Tropical Ecological Agriculture.

The objective of the Outreach Program is:

To enhance the national capacity for research, education and development in the areas of agriculture and natural resources management in the American tropics through training, information dissemination, and technical assistance, and to harness the support of CATIE's stakeholders and their constituencies.

The Outreach Program concentrates its efforts on three main specific objectives, namely

- Enhancement of national systems devoted to agricultural and natural resources research and development,
- Participative validation, demonstration and dissemination of agricultural and natural resources management practices,
- Institutional promotion, demand analysis, implementation of feedback and consultative processes, and image building at a regional level.

These objectives are sought through four main Outreach Lines:

- **Line 1. Promotion, Cooperation and Technical Assistance,**

Aims to proactively disseminate CATIE's services and products, and to enhance CATIE's institutional presence at a regional level. It identifies opportunities for cooperation aimed toward the enhancement of national research, education and development in the areas of agriculture and natural resources management. It also conducts consultative processes aimed at providing feedback information to prioritize the Center's activities and at harnessing the support of stakeholders at a regional level.

- **Line 2. Participative Validation, Demonstration and Transference of Management Practices**

Aims to validate, demonstrate, improve and disseminate management practices which may contribute toward sustainable development in the areas of agriculture and natural resources management, through participative processes. Promotion, coordination and monitoring of validation and development

Through its four lines, the Outreach Program aims to enhance national systems devoted to agricultural and natural resources research and development, encourage participative validation, demonstration and dissemination of agricultural and natural resources management practices, and improve institutional promotion, demand analysis, implementation of feedback and consultative processes, and image building at a regional level.

projects, local knowledge gathering and testing, enhancement of feedback mechanisms, and regional networking for V&D purposes, are main elements of this Line.

- **Line 3. Continuous Education through Training and Conferences,**

Aims to improve the region's human capital of the national agricultural and natural resources research, education and development systems, thus contributing towards the improved effectiveness and efficiency of organizations and institutions, and to the general performance of national systems.

- **Line 4. Information Management and Dissemination.**

Aims to compile, integrate, synthesize, publish and disseminate information produced by CATIE and others, using the whole spectrum of modern media and communications strategies.

Figure 3 shows the overall scheme for CATIE's Outreach Program, including a detailed description of inputs and outputs needed to reach the ultimate goal of enhancing national capacities.

The following is a description of the four Outreach Lines:

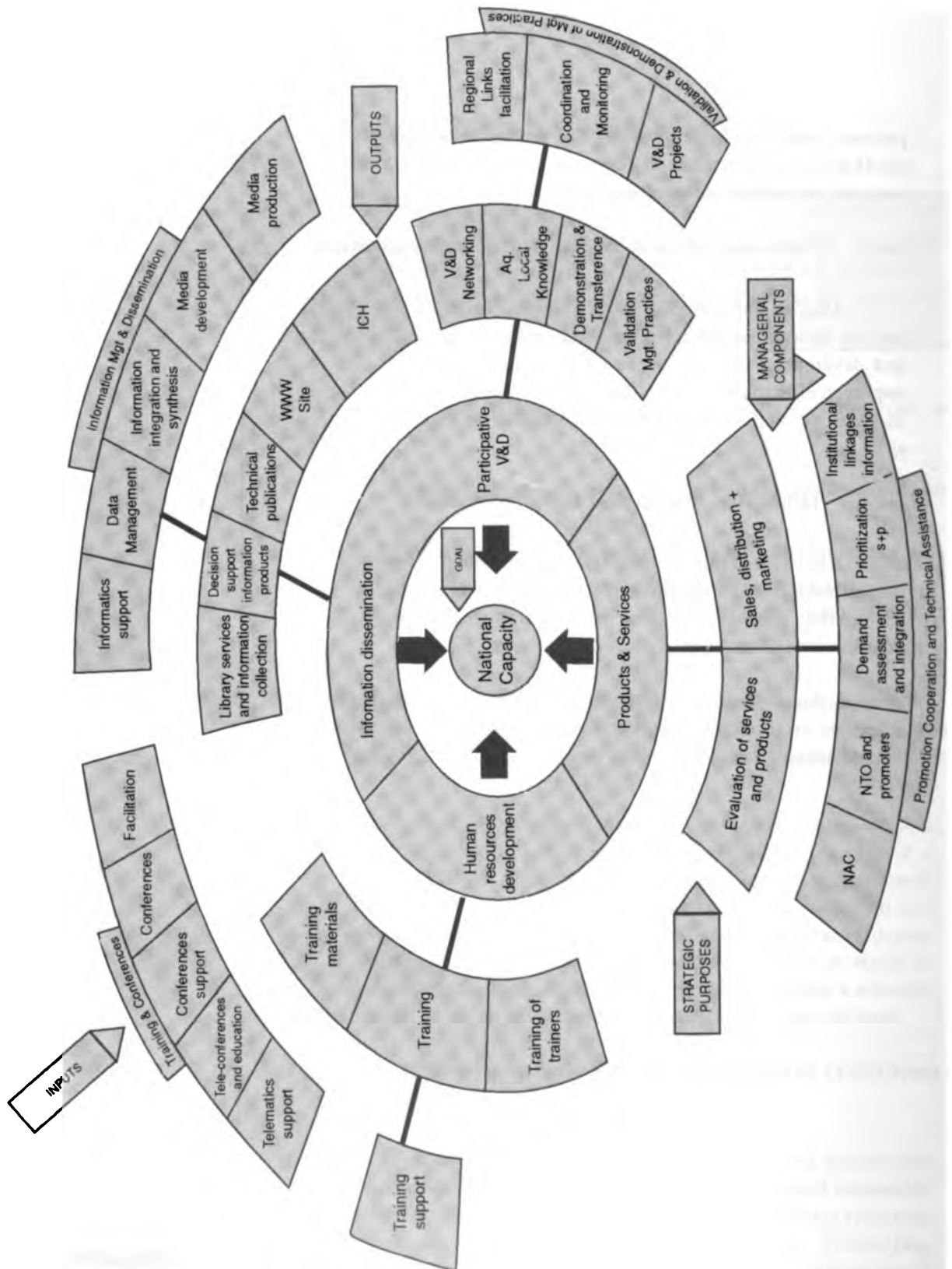


Figure 3

Outreach Line 1

Promotion, Cooperation and Technical Assistance

Promotion of CATIE's products and services, enhancement of linkages, conduction of consulting and feedback processes, and image building at a regional level, are crucial activities to improve the Center's impact and to secure the support of its stakeholders and constituencies. Demand analysis and marketing at the country level to proactively move out products and services are activities channeled through the National Technical Offices (NTOs) and the National Advisory Councils (NACs), which are fundamental players in this context.

Technical cooperation is a crucial component of CATIE's strategy to contribute to social and economic development and to the sustainability of the resource base and the environment in tropical America. Strengthening national organizations and institutions of both the public and private sector, is one of the objectives of these efforts. Research, higher education and development institutions, extension services, projects, planners and policy makers are the main beneficiaries and clients. Strategies for technical assistance include the provision of technical advisory services through in-house expert services or external associate consultants.

The NTOs are the center's permanent bases for in-country operations, and are in charge of providing an active link with the public and private sector in each country, the local offices of the international development agencies and the media. The NACs are honorary councils constituted by selected high representatives of the private and public sectors of each member country. They constitute the highest level fora to promote the Center's products and services, identify opportunities, prioritize actions and evaluate institutional achievements and impacts at a national level.

National Advisory Councils (NACs)

These councils constitute CATIE's main global link with the member countries' public and private sectors in the areas of agriculture and natural resources. With representatives from Ministries, the private sector, universities and NGOs, the NACs constitute the most important fora to identify demands and opportunities, discuss and prioritize CATIE's activities at the national level, and obtain feedback and macro-evaluation of the global institutional impact at a country level.

NACs have been established in Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua, and have shown effectiveness and great potential.

National Technical Offices (NTOs)

NTOs are CATIE's permanent in-country operational platforms, and a key linkage instrument with national institutions and organizations. These offices, at present are fully operational in El Salvador, Honduras, Guatemala and Nicaragua. The recently created office in Costa Rica is still undergoing the initial organization phase. All NTOs have the following objectives:

- To facilitate CATIE's in-country operations and maintain institutional coherence among them.

Promotion of CATIE's products and services, enhancement of linkages, conduction of consulting and feedback processes, and image building at a regional level, are crucial activities to improve the Center's impact.

NACs and NTOs work in the member countries as linkages with the public and private sectors, universities and NGOs.

- To proactively disseminate CATIE's services and products and to seek opportunities for providing new and better ones. Services and products include training courses, postgraduate education, technical advice, publications, library and documentation services, germplasm and project management and proposals.
- To cultivate a positive image and favorable attitude towards CATIE among decision makers, stakeholders in general and its constituencies.
- To stay informed on macro-political, economic, social and institutional tendencies, so that CATIE can adapt to the changing institutional context.
- To consolidate and expand CATIE's funding base at the national level.
- To expand the scope and number of organizations and institutions linked to CATIE.
- To foster institutional mechanisms of importance to CATIE, e.g. NACs, networks alumni associations, etc.
- To give technical advice to R&D organizations and institutions, extension services and development projects, and to planners and policy makers.

Figure 4 shows these dynamic linkages with partners and allies in CATIE's member countries which are coordinated by the Outreach Program with local coordination by the National Technical Offices.

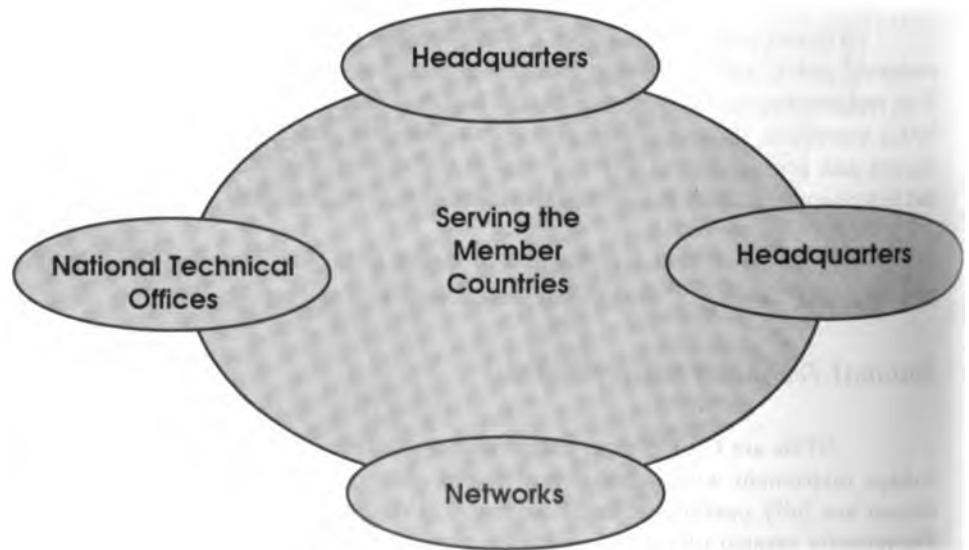


Figure 4.



Outreach Line 2

Participative Validation, Demonstration and Transference of Management Practices

Validation, demonstration and dissemination of management practices have been crucial instruments through which CATIE has contributed to development in the region. Examples of successful initiatives in this area include the regional AID-ROCAP Multiple Use Trees project (Madeleña), the NORAD-funded Integrated Pest Management project, based in Nicaragua, and the participative natural resources management OLAFO project, a regional initiative funded by NORAD, SIDA and DANIDA. All of these projects have been actively working in validation, demonstration and transference of technologies, performing activities at different levels, including the institutional and community level. In addition, all of them have coordinated activities with national institutions, NGOs, Community Organizations and other projects, to share and aggregate experiences and resources, and achieve visible impacts at the field level.

CATIE aims to contribute to the summarization of experiences, and to networking of V&D projects in the region. These projects develop and test methods and technologies, and offer a variety of services and products that contribute directly to social and economic development for the rural populations, and to the enhancement of natural resources management and related policies. The balance between "V" and "D" varies among projects, and also during the time span in which those projects are executed. As a regional permanent actor in agricultural and natural resources research, education, validation and development, CATIE can play a central role in the analysis, summarization and dissemination of the best practices and successful experiences in V&D at a regional level.

CATIE aims to contribute to the summarization of experiences, and to networking of V&D projects in the region.



CATIE

Fundamental activities of this Line of Outreach are:

- Coordination and monitoring of technology validation, demonstration and transfer efforts, including those related to the implementation of validation and development (V&D) projects,
- Proactive identification of opportunities, and elaboration of proposals for V&D projects,
- Networking among V&D projects, NGOs and national institutions, for participative technology enhancement and coordinated transference, and
- Discussion, interchange and summarization of V&D experiences at a regional level.

Outreach Line 3

Continuous Education through Training and Conferences

Training is a teaching and learning process which aims to encourage the acquisition of new knowledge and abilities and the modification of attitudes in a specific occupational field through short term activities. The strategic value of CATIE's training courses lies in their effect on strengthening the operational level of regional and national institutions. In a short period of time, they equip a significant number of personnel with effective tools for mastering new technologies and production and conservation practices.

CATIE trains over 5000 high level professionals each year in short courses lasting between one week and three months. Participants come from CATIE's member countries and others in Latin America and the Caribbean. Training opportunities are also offered for decision-makers at all levels, community leaders, social workers, and other "change agents", to enable them to contribute toward sustainable development. Emphasis has been placed on courses delivered in the countries, rather than at headquarters.

In the recent past, CATIE's training was mainly instructor-based and relied basically on in-house staff, largely researchers. A gradual shift toward less instructor-based and more media-based training is foreseen, and furthermore, the remaining instructor-based training will increasingly rely on external rather than in-house trainers.

Future strategy includes assembling a cadre of certified external instructors to be on call for training duties with CATIE, and strengthening the teaching and technical skills of these instructors.

Furthermore, CATIE will develop the capacity for media-based training. Capacity in the development of multimedia training materials, both for electronic dissemination through our WWW site and through CD-ROM technology, as well as for tele-education, will be incorporated. A general trend is foreseen in which most of CATIE's services and products will become amenable to electronic delivery.

Analysis of training needs and demands, and priority setting, considering requests from member countries, is a crucial part of the strategy. Part of the strategy is also the cooperation with international and national institutions, NGO's and projects, for joint identification and delivery of training events.



In the recent past, CATIE's training was mainly instructor-based and relied basically on in-house staff, largely researchers. A gradual shift toward less instructor-based and more media-based training is foreseen.

Outreach Line 4

Information Management and Dissemination

This Outreach Line aims to elaborate and disseminate scientific and technical information, in support of the activities and, especially, the decision making capabilities of the various players involved in agricultural and forest production and in the conservation of natural resources and the environment in tropical America. It compiles, integrates, publishes and disseminates information, produced by CATIE and others, using traditional and modern electronic media, the main purpose being to contribute to the effectiveness and efficiency of national R&D and technology transfer.

With modern information systems and telematics technology, the Area aims to bring together, expand and potentiate pre-existing information and communication functions, creating a new system with characteristics of its own.

With modern information systems and telematics technology, the Area aims to bring together, expand and potentiate pre-existing information and communication functions, creating a new system with characteristics of its own. This is the vision of a future Information Clearing House to be developed within the institution, which will serve research and development, boost the impact of education and training efforts, contribute to the production and related business industry, and provide crucial information for policy making.

Core products and services of this Line are:

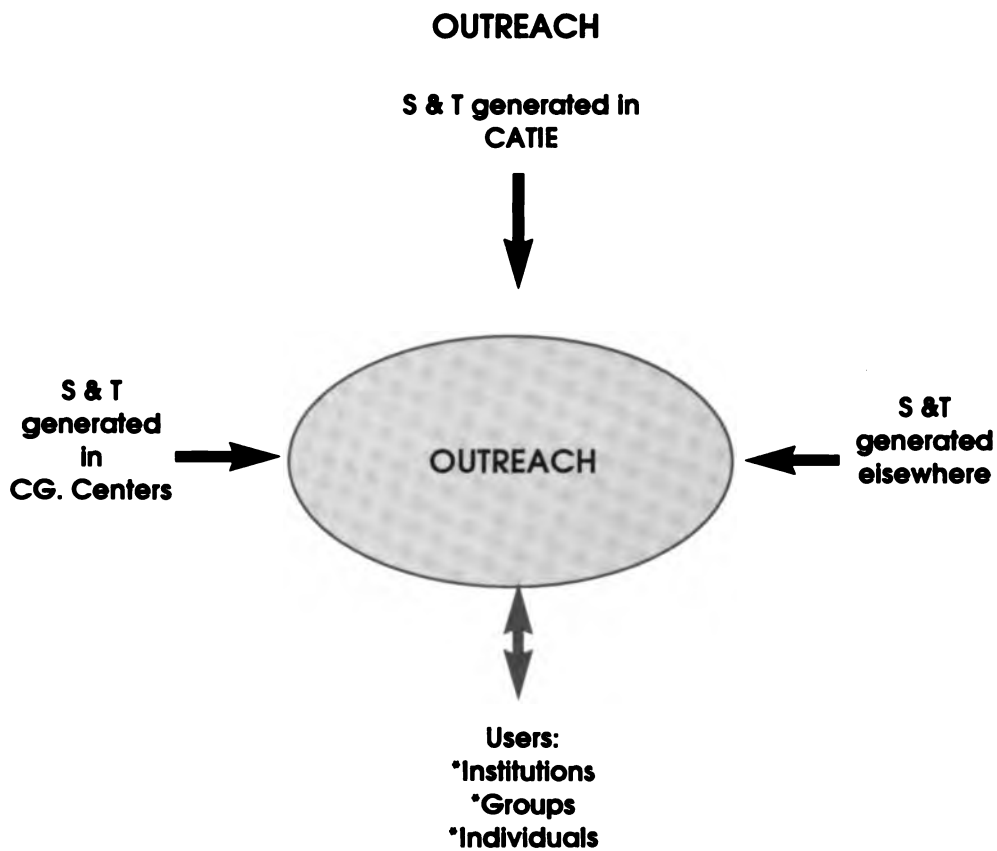
- Library Services and Information Collection,
- Decision Support Information Products –including bibliographic and scientific databases, and expert systems-,
- Technical Publications –including CATIE’s technical journals,
- The WWW site, with its main functions: presentation of CATIE, selling and marketing of services and products, dissemination of technical information, and interaction with people worldwide,
- Information Integration and Synthesis,
- Computer Systems Support, including data base elaboration/maintenance,
- Media Development and Production,
- Telematics and Teleconferences support.

The following periodicals produced by CATIE will be reinforced: Central American Forestry Journal, Integrated Pest Management Journal, and the Agroforestry in the Americas Journal. Other bulletins and technical publications will be continued: Silvoenergy, Genetic Improvement and Forest Seed Management Bulletin, Integrated Pest Management Bulletin. The Scientific Series dealing with Multiple-Use Trees, Tropical Forest Management and Silviculture, Agroforestry Systems, Integrated Pest Management and Biotechnology and Conservation for Development, will be enhanced.

Texts, conference and workshop proceedings, informative bulletins, including those related to networks such as REDCA, will continue to be published as part of CATIE’s institutional communication efforts.

The possibility of fusing some of the institutional journals will be analyzed.

Figure 5 shows CATIE's approach for the dissemination of scientific and technological information to institutional clients and end users. Information from different sources is gathered, synthesized and distributed.



S & T = Science and Technology

Figure 5

CATIE

INSTITUTIONAL IMPLEMENTATION AND STRATEGIES

STRATEGIC MANAGEMENT

Lust as agricultural production, conservation and management of natural resources and higher education for development and conservation are important facets for the successful execution of the strategic plan, strategic management is of equal importance. CATIE's administrative strategies call for fund management that is unquestionably open to scrutiny, and resource allocation and use that is indisputably efficient, so that the Center acts as a model of its kind. In this way, all administrative functions will be at the service of science, education and development and not the opposite.

All administrative functions will be at the service of science, education and development and not the opposite

To establish a flexible, efficient management style that is open to scrutiny for financial resource management and allocation, performance and accountability, as well as for the selection of human resources employed by the Center and the tasks they should perform.

To develop the Center's activities according to its priorities and availability of resources, emphasizing the execution of graduate education, training, research and transfer programs.

To hierarchize decision making and administration management of the different organizational layers at CATIE for opportune implementation of programs and projects.

To strengthen the permanence of the institute's comparative and competitive advantages and strengths in relation to their financial sustainability.

To support inter-program and inter-institutional cooperation, and offer CATIE's strengths to national institutions in order to enhance research and education in the countries.

To improve liaisons with strategic partners.

To enhance prospection, demand analysis and feedback to streamline and prioritize.

To enhance the strategy and to continue previous efforts to achieve financial sustainability.

ACTION PLANS

Each Program is responsible for developing and executing an Action Plan, complementing CATIE's Strategic Plan. These plans cover four years and are updated every two years. They are elaborated using the guidelines laid out in this Plan, preferably in matrix form, so that the activities for each Program are clearly shown along with the Areas, geographic sites and objectives, goals, expected impacts, verifiable and quantifiable sustainability indicators, financial resources and assumptions.

Action plans allow CATIE's Office of the Director General to orient, monitor and evaluate the Strategic Plan's execution and the fulfillment of its Programs, Areas and Projects. These will be an integral part of the Strategic Plan. Figure 6 shows the operations used to update work plans and the Strategic Plan in greater detail.

Action plans allow CATIE's Office of the Director General to orient, monitor and evaluate the Strategic Plan's execution and the fulfillment of its Programs, Areas and Projects.

Figure 6. The Strategic plan arises from prioritization of the most pressing world-wide and regional problems. End users and national governments participate within CATIE's mandate taking into account comparative advantages and institutional strengths.

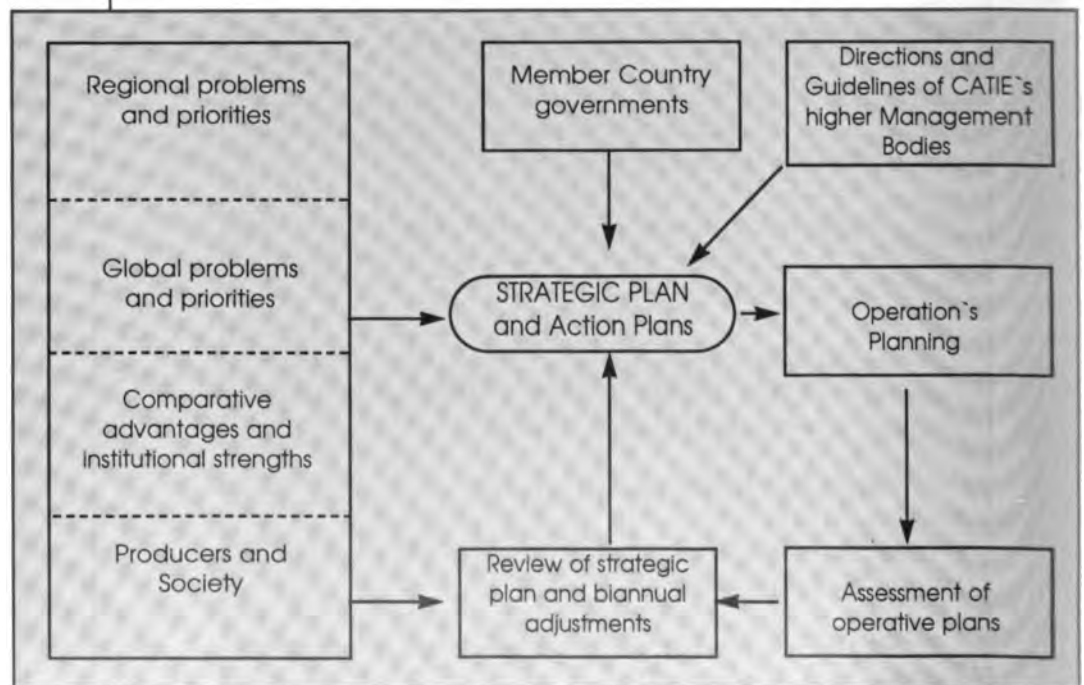


Figure 6

Bi-annual work plans will be based on the three Program's Action Plans. These plans constitute the basic background for the elaboration of individual work plans and for the elaboration of project proposals to be submitted to donor and cooperation agencies for consideration, and most importantly to formulate the yearly budget, and to evaluate professional personnel.

OPERATIONAL METHODS

The Central Headquarters will act as a focal point for implementing the Strategic Plan. This involves maintaining coordination, coherence and synthesis of activities carried out by Programs in the countries, development and implementation of standard research methodologies, information management and diffusion and regional level dissemination, education and training.

Projects are developed in CATIE's member countries under the direction of the Programs, using the plan as a framework and following its design and guidelines. This and other activities aim to strengthen one or more national institutions as a counterpart to the Center in each member country.

One of CATIE's operative principles is the establishment of research, teaching and cooperation activities in conjunction with national and international institutions and organizations, both in the private and public sector. The Institution actively supports an integrated focus for agricultural and natural resource sustainability. For this reason it stresses i) technical collaboration with measurable impacts at the field level and in technology generation and ii) the execution of production, education, training and conservation aspects with institutions worldwide, using CATIE as a liaison center for tropical America.

CATIE has a collaborative relationship at the international institution level with CCAD, CARDI, CIAT, CIFOR, CIRAD, Colorado State University, CORECA, EARTH COUNCIL, ANDEAN PACT, CAC, FAO, ICRAF, IDB, IICA, INIBAP, IPGRI, ISNAR, IUCN, NRI, OFI, OIRSA, ORSTOM, PROCITROPICOS, PROMECAFE, UNEP, University of Florida, and WWF among others. Equally close relations are maintained with each member country's research, education and services system and prestigious universities and research institutions in North America, Europe and Asia. (Table 1)

One of CATIE's operative principles is the establishment of research, education and outreach activities in conjunction with national and international organizations, in both the private and public sector.

Table 1. Some organizations and institutions currently cooperating with CATIE and which are expected to cooperate in future activities in tropical America.

ACTIVITY

AREA	RESEARCH AND VALIDATION	EDUCATION AND TRAINING	TECHNICAL COOPERATION	POLICY AND INSTITUTIONAL STRENGTHENING
Sustainable Tropical Agriculture	CIRAD, CIAT, AVRDC, FAO, INIBAP, FHIA, CARDI, IPGRI, ORSTOM, CIMMYT, NATIONAL INST., NRI, FHIA, AVRDC, OIRSA, CARDI, EPA, USDA, CIAT, NATIONAL INST., CRSP, CONSORTIUM, NORAD, CABI-BIOSCIENCE	CORNELL U., U.A. WAGENINGEN, CP-CHAPINGO, REDCA, INBIO, OAS, LOUISIANA STATE U., HOHENHEIM U., EPA, CORNELL U. OAS, IICA, LOUISIANA STATE U., NORAD.	NATIONAL INST., PROMECAFE, REMERFI, PROCITROPICOS, SICTA, NGO's PROD., ASSNS., APHIS, EPA, ISNAR, SICTA, NORAD, FIBL	IICA, IDB, NGO's, WB, IFPRI, CORECA, OIRSA
Watershed Management and Agroforestry Systems	ICRAF, REDCA, OTS, USDA, NATIONAL INST., NFTA, UFLA, ISRIC, CIAT, OFI-OXFORD, FAO, ORSTOM, CLARK U., UNEP, IICA, NGO's, UNPD, INA, U OF COPENHAGEN, U ALBERTA, U GOTTINGEN, U. BAYREUTH, CORNELL U.	UACH, EAP U, LAVAL, OAS, U PAZ, IICA, WISCONSIN U, UNESCO, UICN, REDCA, IICA, U ALBERTA, U GOTTINGEN, U FLORIDA	NATIONAL INST., ICRAF, ISNAR, PROCITROPICOS, U BAYREUTH, EARTH COUNCIL, PRODERE, CARE, CCAD, NGO's, UNPD, FAO, WFP	IICA, NGO's, IDB, CABEL, IFPRI
Economics and Sociology of Production and Conservation	WRI, IFPRI, UNDP, UNEP, U OF HANOVER	IICA, INCAE, REDCA, OAS, BEJER INSTITUTE, U. OF CHILE, EAP	IICA, NATIONAL INST., NGO's U. GOTTEBORG, BEJER INSTITUTE	IICA, IDB, WB
Management and Conservation of Forests and Biodiversity	CIFOR, PAFT-CA, CIRAD, ITTO, GEE, PNUMA, IITF, USDA/FS, UNDP, NATIONAL INST., OFI-OXFORD, FAO, U HELSINKI U., MISIONES, WWF, IUCN, CI, CCT, WCS, TNC, OTS, ISNE	OXFORD U., REDCA, INBIO, OAS, IICA, LOUISIANA STATE U., U. FREIBURG, UNESCO, IUCN, WWF, NGO's	EARTH COUNCIL, CCAD, NATIONAL INST., NGO's, PROCITROPICOS	IICA, IDB, CABEL, WB, UNEP, WRI, NGO's

This cooperation takes on many forms. Some of these are:

- a) **Complementation with IICA.** Working relations with IICA in tropical countries for human resource development, research transfer, documentation and information, policy formulation, and national institution strengthening will be reinforced. This relationship complements CATIE's research, education and transfer work with technical cooperation and institutional strengthening in IICA.
- b) **Regional liaison with WWF-US, IPGRI-INIBAP, CIFOR, ICRAF and similar institutions.** Joint research, training and regional projects which seek solutions to global problems will continue. This will avoid duplication and exploit the mutual strengths of organizations to benefit the inhabitants of the tropics.
- c) **Institutional cooperation with CIRAD, ORSTOM, NRI, CIAT, ISNAR, and others.** Joint actions in specific areas of mutual regional interest with institutions that have scientific projects in a complementary and synergistic effort, to tackle problems of common interest.
- d) **Joint cooperation in postgraduate education with Wageningen Agricultural University, Colorado State University, University of Florida, University of Alberta, Université Laval, Texas A&M University, Louisiana State University, Bayreuth University, University of Göttingen, Hohenheim University, and Freiburg University, among others.**
- e) **Proactive participation in scientific and educational networks such as REDCA, PROMECAFE, PROCITROPICOS, and REMERFI.**

Education and training, for the most part, are conducted in coordination with the Regional Network for Cooperation in Research, and Higher Education in Agriculture Natural Resource Management, and the Environment (REDCA). This network links universities, research centers and official organizations in the region and certain select universities in the United States of America, Canada and Europe. REDCA is made up of over 200 institutions from Central America, the Caribbean, North America and Europe.

CATIE is a member of NATURA, the network of European agricultural (tropically and sub-tropically oriented) universities and scientific complexes related with agricultural development. Concerted actions in the fields of tropical agriculture and forestry with European partners are sought through this affiliation.

CATIE's collaboration includes close cooperation with donor organizations. Thanks to this cooperation, CATIE has been able to benefit the population and governments of its member countries. The confidence donor organizations show in CATIE, the mutual respect and endorsement of technical decisions, is a measure of the Center's achievements.

The new Strategic Plan, backed by strategic management, is assured continued support from the international community. The following are some of the

The confidence donor organizations show in CATIE, their mutual respect and endorsement of technical decisions, is a measure of the Center's achievements.

CATIE has designed a scheme for financial sustainability which guarantees execution of the action plans and strengthens the institution so as to fulfill its objectives.

donor organizations who have given valuable support in the past, and whose continued cooperation is envisaged: ACRI, USAID, CABEI, CIDA, DAAD, DANIDA, DSE, DSO-IO/Netherlands, Spain, EU, FINNIDA, The Tropics Foundation, FUNDATROPICOS, GEF, GTZ-BMZ, IDRC, IDB, JICA, MAE France, NORAD, DFID, PROCADES, Republic of China, SAREC, SDC, SIDA, UNDP, UNEP, and WB, among other institutions.

CAPITAL DEVELOPMENT

CATIE has designed a scheme for financial sustainability which guarantees execution of the action plans and strengthens the institution so as to fulfill its objectives. The most important points of this scheme are:

- a) creation of professorships (Chairs) financed by international institutions, the private sector, and foundations.
- b) negotiation of the permanent assignment of visiting professors, scientists and development experts, paid for by various bodies, whose objectives are similar to those of CATIE.
- c) permanent sponsorship of graduate and training scholarships and permanent financing of specific activities in the Center by the international community.
- d) creation of endowment funds managed by either of two foundations (FUNDATROPICOS or The Tropics Foundation) at CATIE for the long term investment of at least US\$100 million. The interest earned will finance the Center's activities.
- e) sale of services such as accommodation, consultancies, publications, software, conferences, congresses, and technical assistance at market prices.
- f) commercial production on the Center's farms using the latest advances in agricultural sustainability (using technologies to demonstrate that they are profitable).
- g) collaboration, either as a member, or as regional liaison with worldwide entities for global efforts.
- h) sale of information on agriculture, natural resources, the environment, and sustainability issues.
- i) sale of genetic material or licensing of intellectual property or patents.

Financial security is essential to support basic research, education, and cooperation programs which allow the Center to develop this Strategic Plan, and complement its activities through specific projects.

In June 1993 the Foundation for Education and Research for Natural Resource Development and Conservation in the American Tropics (FUNDATROPICOS) was created with the main objective of receiving endowment funds to support the Center's operations and achieve institutional sustainability. In 1998, a second foundation will be established in the U.S. and will be registered as a 50(c) 3 institution by the I.R.S. It will raise funds for CATIE in that country.

FUNDATROPICOS' constitution and smooth running deserves special attention. The Foundation is designed to handle grants, donations, the endowment fund and resources earmarked for this purpose. It is also responsible for procuring resources which help CATIE achieve financial sustainability.

FUNDATROPICOS' contribution and smooth running deserve special attention. The Foundation is designed to handle grants, donations, the endowment fund and resources earmarked for this purpose.

RESOURCE NEEDS AND ALLOCATION

Financial resources

Although the institutional financial scheme has improved in recent years, and the percentage of funding which may be identified as core budget has increased, CATIE's financial sustainability still depends on fixed-term projects and earmarked contributions to carry out the majority of its actions.

As mentioned earlier, CATIE is consolidating its three Programs: Education, Research and Outreach. Financial continuity must be assured to maintain the critical mass of human, financial and physical resources required to help the region. Projects are needed to complement and strengthen the central programs.

Currently, more than 50% of total financing corresponds to core budget. This means that the goal established for the year 2002, i.e. to have a balanced budget with 50% from core budget and 50% from projects has been already reached. However, it must be understood that only 30% corresponds to unrestricted core, and that a high percentage of the core budget is composed of fixed-term contributions. Strategies to encourage and enlarge long-term contributions, as well as to enhance the endowment fund managed by FUNDATROPICOS, should be sought.

Currently, more than 50% of total financing corresponds to core budget. This means that the goal established for the year 2002 has already reached.

CATIE's core budget assignment is divided into three large categories: education, research and outreach; management and administration; and self-financing production activities. It is hoped that over the next ten years, education, research and outreach will be assigned 85% of this budget. Transfer and technical cooperation aspects are included in each program.

CATIE

CATIE is aware that donor agencies, operating with funds from public contributions, want to offer genuine assistance to communities and aid in the sustainable management of natural resources in tropical America.

CATIE is aware that donor agencies, operating with funds from public contributions, want to offer genuine assistance to communities and aid in the sustainable management of natural resources in tropical America. They do not want their contributions to maintain intermediary bureaucracies but rather to finance efficient technical programs.

CATIE's formal commitment is to see that administrative and management expenditures be kept under 10% of the core budget, and that funds for education and research increase until they amount to at least four fifths of CATIE's total core budget.

The minimum annual core budget needed for the Center in constant 1998 dollars is US\$9.0 million. With this sum, the Center can carry out relevant regional activities with a critical mass of 20 international staff members at Ph.D. level, 30 national staff members either with Ph.D. or M.Sc. level, and 150 support personnel, and also strengthen the three programs for sustainable agriculture in the tropics.

The following shows the estimated amounts per line item needed for the core budget (Table 2).

TABLE # 2
REAL DEMAND OF FINANCIAL RESOURCES FOR CATIE'S CORE BUDGET

Description	Amount (million US\$)	Distribution (%)	Main Purpose
PPI and PPN (International and national professionals)	2.8	31.1	R
Postgraduate scholarships (*)	1.2	13.3	E
Training courses (*)	1.0	11.1	O
Communications, dissemination, library	1.0	11.1	O
Computer Center, Laboratories, and Experimental Areas	1.0	11.1	R/E/O
Conferences and Seminars	0.5	5.6	O
Administration & Management	0.8	8.9	A/M
Maintenance	0.7	7.8	R/E/O
TOTAL	9.0	100.0	

(*) Income from these activities will finance research's operational activities

Funds for projects will continue to decrease from the 1992 sum of nearly US\$12 million annually to less than US\$7 million annually.

CATIE

The increase in core budget should be in accordance with the ability to negotiate aid. However, the goal is to reach an average annual growth of 8% to be achieved in six years (1998-2003).

According to the Institutional Development Plan, the number of professional staff members should rise from 53, corresponding to the period 1995-1998, to a total of 70, for the period 1999-2002. The drastic increase forecasted for the next five years can only be attained if donors switch financial contributions which are presently in the form of projects, to core budget donations.

Human Resources

CATIE's Strategic Plan places high priority on the permanent employment of professionals in the specialization most relevant to its tasks. The year 1992 is used as a reference point, and a more significant presence in the countries will be sought.

To do this, the number of professionals should be increased compared to support personnel to achieve a maximum proportion of support personnel: professional personnel of 3 :1, with assignments in the strategic areas identified in the Plan.

Table 3 shows the total number of professional personnel sought by the year 2002 for CATIE's different Programs.

TABLE # 3
PROFESSIONALS (NATIONAL AND INTERNATIONAL) REQUIRED
IN CATIE'S CORE BUDGET

	1992 ^a		1997 ^a		1999 ^e		2002 ^e	
	Ph.D.	M.Sc.	Ph.D.	M.Sc.	Ph.D.	M.Sc.	Ph.D.	M.Sc.
Research	3	3	18	10	15	20	17	30
Education ^b	2	1	3	2	3	2	3	2
Outreach	-	1 ^d	3	5	2	8	2	8
Top Management ^c	1	1	2	1	2	2	2	2
Total	5	6	26	18	22	32	24	4
Grand Total	11		44		54		28	

- a. Data as it was presently reflected in August 1992, and 1997, respectively
- b. These executives, and collaborators manage the Graduate School
- c. Includes Direction General, Deputy Direction General, Direction of Strategic Planning and External Cooperation
- d. At the time: Head of Training Area
- e. Will include doctoral students

The number of professionals should be increased compared to support personnel to achieve a maximum proportion of support personnel.

CATIE will spare no efforts to implement the monitoring and continuous assessment of this Strategic Plan.

These goals will be reached by employing personnel with wide experience and high academic qualifications, as opposed to the tendency in the 80's of giving preference to support staff. These professionals will be aided by Research Assistants (students) from the Graduate School and permanent assistants.

CATIE's personnel will work in locations that allow research and validation in collaboration with national institutions. Eventually, CATIE will place professionals in institutions in the countries to carry out specific tasks of mutual interest.

IMPACT MONITORING AND EVALUATION

CATIE will spare no efforts to implement the monitoring and continuous assessment of this Strategic Plan. Among the monitoring mechanisms will be annual reviews of Programs and Areas, including Action Plan execution for each agroecological area and reference population, mid-term and final evaluations for projects funded by donors, meetings of the Board of Directors and Council of Ministers and formal reviews of the Strategic Plan every two years.

Critical dimensions of the institution's vision are the need and urgency to:

- Attain a measurable impact at the field level, through appropriate validation and transference mechanisms.
- Promote appropriate solutions directed towards alleviation of poverty and halting environmental degradation.
- Address issues related to agricultural productivity and sustainability, and access to food.
- Implement research and education agendas sensitive to social and gender issues, and to socio-environmental interactions.
- Harness modern connectivity, information systems and electronic tools, to improve the implementation and diffusion of new technologies and scientific knowledge.
- Expand strategic alliances with research institutes and universities within and outside the region.
- Strengthen cooperation with public institutions, NGO's, R&D projects and producer associations to cooperate in validation and transference.
- Continue to build on CATIE's own accomplishments and regional knowledge.

CATIE's and its Programs' impact was evaluated at mid-term (1992-1996) through the verifiable indicators set out in each Program's action plan, and through the findings of an external evaluation team (1996). Evaluations will give special attention to:

- * Development of research and validation results. These represent a considerable contribution to the science and practice of renewable natural resource management in the fragile ecosystems of tropical America.
- * Sustainable technologies and practices used by end users in resource management and agricultural production.
- * Field level promotion and use of appropriate technological options for resource use.
- * Number and type of users of technological options developed and validated.
- * Professional development and human resource training in new directions.
- * Strengthening national scientific capability in the fields of sustainable development and conservation.
- * Number and type of requests received and dealt with efficiently.
- * Number and type of publications and outreach activities.
- * Management and allocation of core budget.
- * Management of human resources and infrastructure.
- * Institutional image in each country and in the region.

However, it must not be forgotten that the main purpose of this Plan's implementation lies in its impact at the field level. Only here can it be said to have achieved its goals and fulfilled its mission. If the knowledge, technologies and alternative practices are not available or utilized by end users by the end of the 90's, it will be hard to justify the Center's existence according to the Strategic Plan. There must be clear and measurable indications that it has contributed to sustainable use of ecosystems and, thus, has broken the vicious circle of rural poverty and land degradation.

It must not be forgotten that the main purpose of this Plan's implementation lies in its impact at field level.

CATIE

GLOSSARY OF INSTITUTIONAL ABBREVIATIONS

APHIS	American Plant Health Information Service
CABEI	Central American Bank for Economic Integration
CAC	Central American Agricultural Council
CARDI	Caribbean Agriculture Research and Development Institute
CATIE	Tropical Agriculture Research and Higher Education Center
CCAD	Central American Commission for the Environment and Development
C.CHAPINGO	Postgraduate School of Chapingo
CCT	Centro Científico Tropical (Tropical Scientific Center)
CGIAR	Consultative Group for International Agriculture Research
CI	Conservation International
CIAT	International Tropical Agriculture Center
CIDA	Canadian International Development Agency
CIFOR	Center for International Forestry Research
CIP	International Potato Center
CIRAD	International Agricultural Research and Development Center of France
CORECA	Regional Council for Agricultural Cooperation in Central America, Mexico and Dominican Republic
DAAD	German Academic Exchange Service
DANIDA	Danish International Development Agency
DSE	German International Development Foundation
DSO-IO	Direct Aid to Educational Establishments in Developing Countries, The Netherlands

EU	European Union
EPA	US Environmental Protection Agency
FAO	United Nations Food and Agriculture Organization
FHIA	Honduran Agricultural Research Foundation
FINNIDA	Finnish International Development Agency
FUNDATROPICOS	CATIE Foundation
GEF	Global Environmental Fund
GTZ	German Technical Cooperation Agency
ICRAF	International Center for Research in Agroforestry
IDB	Inter-American Development Bank
IDRC	International Development and Research Center
IICA	Interamerican Institute for Cooperation on Agriculture
IITF	International Institute for Tropical Forestry
INBIO	Biodiversity Institute-Costa Rica
INCAE	Central American Business Administration Institute
INIBAP	International Banana and Plantain Research Institute
IPGRI	International Plant Genetic Resources Institute
ISNAR	International System for National Agricultural Research
ITTO	International Tropical Timber Organization
IUCN	International Union for the Conservation of Nature
JICA	Japan International Cooperation Agency
MAE	External Affairs Ministry, France
NFTA	Nitrogen Fixing Tree Association
NORAD	Norwegian International Development Authority

NRI	Natural Resources Institute, Great Britain
OAS	Organization of American States
ODA	Overseas Development Administration, Great Britain
OFI-OXFORD	Oxford Forestry Institute, Oxford University
OIRSA	Regional International Plant and Animal Health Organization
ORSTOM	French Office for Overseas Scientific and Technical Research
OTS	Organization for Tropical Studies
PAFT-CA	Central America Tropical Forestry Action Plan/Central American Forest Council
PROCITROPICOS	Tropical Amazon Science and Technology Program
PROMECAFE	Central America, Dominican Republic and Mexico Coffee Improvement Program
REDCA	Regional Network for Cooperation in Higher Education and Agricultural and Natural Resources
REMERFI	Mesoamerican Phytogenic Resources Network
RISPAL	Animal Production Systems Research Network
SAREC	Swedish Authority for Research and Education Cooperation
SDC	Swiss Development Cooperation
SIDA	Swedish International Development Agency
TNC	The Nature Conservancy
UACH	Autonomous University of Chapingo
UNDP	United Nations Development Program
UNEP	United Nations Education Program
ULVAL	Université de Laval



PRODUCE WHILE CONSERVING,
CONSERVE WHILE PRODUCING

IMPLEMENTING LOCAL SOLUTIONS TO
SOLVE GLOBAL PROBLEMS

CATIE