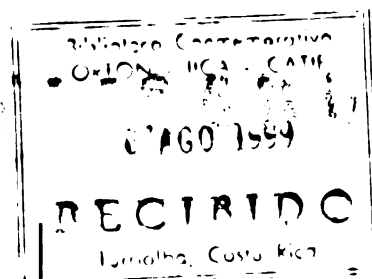

**TROPICAL AGRICULTURE RESEARCH AND
HIGHER EDUCATION CENTER**

AGENDA FOR A CRITICAL DECADE

**STRATEGIC PLAN
1993-2002**

TURRIALBA, AUGUST, 1994



CATIE

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The composition and preparation of the Strategic Plan involved the time, energy and ideas of many people who were consulted on numerous occasions during the different stages of the process. Their participation must be acknowledged even at the risk of involuntarily omitting some names. CATIE wishes to recognize and thank all of them for their invaluable participation.

To begin the process, a series of three workshops were organized in 1992 in which staff members worked out the basis for the Plan. The following personnel participated in these workshops: **José Arze, Jorge Benavides, Arnim Bonnemann, Froylán Castañeda, Rafael Celis, Jean Vincent Escalant, Fernando Ferrán, Rubén Guevara, Luko Hilje, Alvaro Jaikel, Ramón Lastra, Jorge Morera, Rómulo Olivo, Mario Pareja, Danilo Pezo, Octavio Ramírez, Carlos Rivas P., Francisco Romero, Rodolfo Salazar, Joseph Saunders, Assefaw Tewolde, Luis Ugalde and Arturo Vargas.**

Under the coordination of **Dr. Fernando Ferrán**, these three workshops produced a preliminary version of the document which was presented to the CATIE Board of Directors at its 1st Ordinary Meeting on May 14, 1992. The Board delegated the task of following up and assisting the process to the Scientific-Academic Committee.

Under this guideline, **Dr. William K. Gamble**, a member of the Board of Directors, worked with CATIE's chief executives to produce a second version. This was presented to the Board in their 5th Ordinary Meeting on October 5 and 6, 1992, where it was thoroughly analyzed and amplified.

A commission from IICA including **Dr. Eduardo Trigo, Dr. David Kaimowitz, Dr. Gonzalo Steffanel and Ing. Manuel Otero**, along with CATIE's Director General and Program Directors undertook the task of adopting the suggestions and criticisms that had been received to produce a third version in January 1993.

With hopes of achieving the optimum feedback possible and obtaining the criteria of external observers, this document was put through a consultation process and presented by the Director General in various *fora*, including meetings of CATIE's Donor Support Group (twice), the CGIAR Meeting in Washington D.C. in October 1992 and 1993, a meeting for government executives in education, research, production and conservation at IICA Headquarters, Guatemala and the 7th Annual REDCA Meeting held at CATIE in 1993 with the participation of more than 100 higher education, research, extension and rural development institutions from Central, South and North America and the Caribbean. This version was also presented and analyzed by IICA's Executive Committee in June 1993.

Different authorities, at various levels, in more than 20 countries were asked to provide their government priorities. Numerous NGOs, community groups, and the private sector also provided their input to the Plan.

These analyses produced a fourth version of the document which was also sent to well-known scientists who could contribute their knowledge and inputs. Amongst these were **Ronnie de Camino (CIFOR), Gerardo Budowski (University for Peace), Dr. K.J. Neddenriep (GTZ-Germany), Nicolás Mateo (INIBAP) and Jorge León (INBIO).**

The plan's legitimization process included its presentation and discussion in a meet-

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ing of distinguished people convened by CATIE for this purpose in Turrialba. Those attending included **Gilberto Pérez**, ex-Director General of CATIE, **Gerardo Budowski**, **Francisco Morillo**, ex-Director General of IICA, **Jorge Soria** (ex-Director General of CATIE), **Jorge León**, **Eduardo Trigo** (IICA), **Hugh Popenoe**, **Carlos Fiallos**, **Willy Loría**, **William Gamble**, **Robert Sevenhuysen** and a large group of CATIE professionals.

The fourth version was circulated among the principal donors, CATIE member countries (agricultural, natural resources, and environmental authorities), cooperating institutions including IICA and within CATIE.

The final version was presented for a third time to CATIE's Board of Directors in October 1993, where it was approved and its editing and printing ordered.

It should be mentioned that, during this process, CATIE's Council of Ministers were informed of the advances in the document's development on three different occasions (September 1992, May 1993 and January 1994 when it was ratified). The Ministers of Agriculture for CATIE's nine member countries, IICA's Director General, **Dr. Martín Piñero**, **Dr. Xavier Murilo Flores**, President of EMBRAPA, **Hon. Russel García**, Minister of Agriculture, Belize, IICA's Deputy Director General designate, **Dr. David Joslyn**, **Dr. Armando Samper** and **Dr. Francisco Morillo**, ex-General Directors of IICA, **Dr. Mario Seixas** of EMBRAPA and representatives from the private sector of Honduras and the Dominican Republic were present at the final meeting.

Members of CATIE's Board of Directors made important contributions to the Plan. The Chairman, **Frank Bendaña**, and the Vice-Chairman, **Manoel Tourinho**, put all their effort into the process.

Dr. Bjerne Ditlevsen, **Dr. William Gamble**, **Ing. Willy Loría**, **Lic. Guido Martinelli**, **Dr. Whetten Reed**, **Dr. Eduardo Trigo**, **Dr. Thomas Yuill** and **Ing. Manuel Yurrita** also assumed a great deal of the responsibility for producing the Strategic Plan. To them, our most heartfelt thanks.

Finally we would like to thank the personal support given from the countries: from **Prof. Carlos Hank González**, Secretary of Agriculture and Water Resources, Mexico; **Ing. Adolfo Boppel** and subsequently **Lic. Luis Arturo del Valle**, Minister of Agriculture, Livestock and Food, Guatemala; **Ing. Antonio Cabrales**, Minister of Agriculture and Livestock, El Salvador; **Ing. Mario Nufio Gamero**, Secretary for Natural Resources, Honduras; **Ing. Roberto Rondón Sacasa**, Minister of Agriculture and Livestock, Nicaragua; **Dr. César Pereira Burgos**, Minister of Agricultural Development, Panama; **Dr. Pedro Luis Urriola** and subsequently **Dr. Hiran Gaviña**, Minister of Agriculture and Livestock, Venezuela; **Ing. Víctor Hugo Hernández** and **Ing. Pedro Riño**, Secretary and Under-Secretary of Agriculture, Dominican Republic; **Dr. Xavier Murilo Flores**, President of EMBRAPA, Brazil.

We would like to add our special gratitude to **Ing. Juan Rafael Lizano**, Minister of Agriculture and Livestock, Costa Rica, and Chairman of CATIE's Board of Ministers who, at all times, offered his suggestions to make the Plan reflect the priorities of the countries in the public and private sectors and especially in rural tropical American communities.

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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 peasants, 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 Río 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 was also involved at all stages of the planning process, and their agendas and priorities were considered in this 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.

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

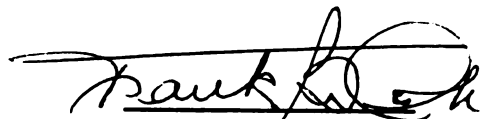
The rate of deterioration of the environment, degradation of the natural resource base, the increase in poverty, and the growing need for food of an expanding population in the American tropics, makes this last decade of the second millennium a critical one in terms of finding permanent solutions to 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.

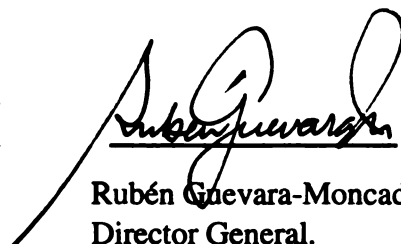
Strategic Planning at CATIE in a highly participative process.

The process took into account Agenda 21.

This last decade of the second millennium is a critical one in terms of finding solutions to environmental problems.



Frank Bendaña R.
Chairman of the Board.



Rubén Guevara-Moncada.
Director General.

CATIE

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 natural resource conservation.

The challenge for resolving this conflict is to increase agricultural and forestry production as well as conserving natural resources. 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 Institute's comparative strengths resulting in a continuous feedback between research, education and technical cooperation, producing a synergistic effect between them.

The Center's traditions and innovatory 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 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 areas for focusing the Center's strategies and actions. These areas are:

Sustainable agricultural production. This aims to increase agricultural productivity sustainably in tropical ecosystems where agriculture, livestock production and forestry already exist. Increased productivity will be closely linked to socio-economic needs, technological development and the ecological sustainability of the American tropics for the benefit of the local population.

Natural Resource Management and Conservation. A balance between development and conservation is sought for utilizing natural resources. These have a direct influence on the soil, water, climate, and biodiversity, of the region, which are themselves the basis for production.

The third area forms an important underlying complement to the other two:

Strategic Management of Resources and Education. This aims to make the scientific and educational efforts of the Center viable. Because of its direct influence on the Institute's operational level in administration, finance, resource allocation, organization, planning, institutional relations, communication, information and information systems, managerial ability is inseparable from scientific and educational excellence as a development tool.

In summary, the strategic plan, with its emphasis on strategic research, higher education, and technical cooperation, aims to lay the foundations for helping society satisfy its food needs without damage to the environment and natural resources, thus improving that society's standard of living.

The Tropical Agriculture Research and Higher Education Center (CATIE) has 51 years 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 have greatest comparative advantage. 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 as part of the Inter-American Institute for Agricultural Sciences (IICA).

The Plan is designed to provide continued reciprocal feedback in research, education and technical cooperation so as to strengthen these activities and consequently the organizations and individuals involved. The current decade is critical for agricultural production and natural resource management and this strengthening will address the most pressing problems of rural communities in tropical America. This will produce viable options allowing rural families to obtain the most benefit from agriculture and natural resources while applying conservation and sustainable development criteria.

CATIE is unique in the American Tropics. It is a regional organization that combines a recognized and well-established postgraduate education program with a sound research and development program. The most important regional problems are addressed by:

- * Generating and promoting new insights in plant protection, silviculture, natural forest and plantation management, agroforestry, land use, tropical crops, genetic resource management and conservation, watershed management (soils and water) and biodiversity management and conservation.

- * Training and updating human resources at postgraduate level. This is essential for higher education, research and agricultural and natural resource development in the American tropics.

- * Technical collaboration with institutions working in this sector and field extension of new techniques and production practice in agriculture, forestry, natural resource conservation and management so as to benefit end users.

CATIE's full members are: Costa Rica and IICA (since 1973),

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

Panama (1975), Nicaragua (1978), Honduras and Guatemala (1979), Dominican Republic (1983), El Salvador (1987), Mexico and Venezuela (1992), and Belize (1994). 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 so have a positive impact on agricultural development.

Over the last six years significant political and economic changes have affected both CATIE and the region as a whole. The Center's mandate for education has been extended to cover the entire American continent and, in 1992, CATIE membership increased from seven to 10 countries plus IICA, increasing the area covered by a factor of three.

There has been a noticeable move towards peace in the region and a tendency towards diversification of responsibilities in the agricultural sector. The democratization process increases the urgency for fighting rural poverty and ensuring a secure food supply, so reducing the risks of a return to armed conflict. Through privatization, formerly government functions will pass into the hands of non-governmental bodies. With the opening of new markets, the private sector will take 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. A variety of different and, sometimes opposed development models has arisen. Some models favor almost exclusive maximization of profit, others promote preservation but few tackle the problem of exploiting natural resources in a sustainable way. In neither case has CATIE's mandate been able to prepare the human resources needed to confront the critical problem of natural resource management nor carry out urgently needed research to achieve sustainability.

The need now arises to *update and reshape* the Institution, its resources and strengths to face the changing socio-economic, political and institutional situation in the region.



External Evaluation

CATIE underwent an external evaluation during August 1990. This 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 in a sustainable environment*.

The external evaluation recommended that CATIE establish its priorities according to its comparative advantages which are: its reputation, experience and knowledge in natural resources, plant protection, silviculture, agroforestry and training human resources for the American tropics.

To endorse this recommendation, the evaluators found that CATIE is involved in over 40 projects of differing size and scope. These projects were designed to achieve specific goals and not to encourage institutional integration as a whole.

The research programs are vulnerable because of their lack of continuity and coherence. It was concluded that the institution's tasks should be prioritized and support the development of a viable program based on the Center's comparative advantages.

For this reason, the current Strategic Plan sets out the activities for achieving these objectives within the context of development and conservation. It pays special attention to management aspects and involves the chief participants, the rural family, as much as possible.

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

The current Strategic Plan sets out the Center's activities, paying special attention to managerial aspects and involvement of rural families as much as possible.

SUSTAINABILITY AS A STARTING POINT FOR A NEW DEVELOPMENT PARADIGM

Sustainability and resource management are becoming more urgent daily because of accelerating soil contamination and degradation along with the need to ensure a food supply for communities living in extreme poverty, above all in the tropics.

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 growing exploitation. In theory, an ecosystem's capacity should respond to the demands imposed by people. For this reason, any discussion of sustainable development needs to reconcile biophysical aspects of water, soil, climate and biodiversity use with social, political, economic and environmental aspects.



In this sense, the concepts proposed by the Bruntland Commission form a useful outline for re-evaluation of the future and the establishment of 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 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 relativized for future generations.

When discussing sustainable development, biophysical aspects of the use of resources such as water, soil, climate and biodiversity must be reconciled with social, political, economic and environmental aspects.

Natural resource potential is finite. Genetic erosion illustrates this situation.

The traditional focus of industrialization through import substitution 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.

A sustainable society with a new ethical frame of reference is sought for the participants so that they adopt a positive attitude and behavior patterns in keeping with the adequate use of natural resources

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. Goods and services developed by society cannot be indefinitely replaced by ecological capital. Human societies cannot always replenish resources used in the production of goods and services. Genetic erosion, for example, illustrates this situation.

Behavior patterns must be re-evaluated. If current consumption is allowed to continue ("*carpe diem*") 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 resources which are already being over-exploited.

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 patterns of behavior 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 training 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 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. 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.

Tropical ecosystems have a restricted range of activities that can be performed without causing irreversible damage. For this reason, most are fragile.

Conservation, as a basis for development, inevitably implies the presence of local communities in ecosystems.



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.

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

- a. ***Maximum Sustainable Ecosystem Use.*** This means in economic and social 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 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. The processes of adjustment to which the economies of our countries are subject do not indicate a reversal of this trend. Furthermore, during the eighties and nineties both internal investment and international aid for agricultural research have decreased considerably or been reassigned.

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

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 natural resources with higher education and human resource training, resulting in the optimum utilization and transference of the knowledge and technology generated.

Current increases in agricultural production can be attributed to the use of technologies developed by past agricultural research. Future growth will depend on the ability of agricultural research to have immediate effects on the standard of living of the community.

As part of the economy, agriculture should efficiently and effectively administrate the scarce resources dedicated to research. However, there is a great disparity in the amounts dedicated to this end in CATIE's mandate area. 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 gross agricultural product, Latin American countries produce a 35 times greater return on each dollar invested than do developed countries. However they only dedicate a quarter of the resources expressed as a percentage of gross product.

This situation places CATIE in a unique position in the American tropics, by combining research in agricultural sciences and natural resources with higher education and human resource training in the region.

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.

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 should be dedicated to research and transfer, emphasizing the transfer and adoption of technology and management practices.

CHALLENGES FACED BY THE REGION

Land degradation and resulting biodiversity loss are irreversible processes. The current decade is critical, especially in the American tropics, since concrete and timely actions must be applied today to solve the most pressing problems. Tomorrow will be too late.

Failure to counteract current tendencies of soil loss, decreasing water quality and quantity, an ensured food supply, flora and fauna conservation and 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 set out below.

GLOBAL CHANGES AS A FRAMEWORK FOR ACTION

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 transport 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.

Land degradation and resulting biodiversity loss are irreversible processes.

Deteriorating resources and quality of life in local communities is just a forewarning for the future.

International relations are gradually changing from an ideological alignment to commercial and environmental interests.

The biological diversity of planet Earth is not only exposed to natural disasters but also to over-exploitation of its resources by human societies.

The present development model is characterized by structural adjustment, economic stabilization, the opening up of commerce as a way of becoming involved with international economics and a dismantling of protectionism.

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 at the Rio Conference and the resulting Agenda 21. Sustainability attempts to solve these problems.

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 the result of the uncontrolled way in which development is currently being carried out.

The member countries of CATIE, 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 of 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. In this context, CATIE is playing an important role in supporting these processes, developing effective coordination mechanisms in the field of agrosilvopastoral technology.

SOCIOECONOMIC AND CULTURAL REALITY

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 1980 level of 22.4 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 levels of poverty. During the 1980's poverty levels grew 45% and at the beginning of the 1990's it was estimated that 70% of the region's inhabitants were poor. Of those, 65% live in conditions of extreme poverty.

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 countryside, 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, 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 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.

Latin American countries face population growth and increased poverty, especially in rural areas.

Sixty five percent of the region's poor are rural inhabitants. This has an impact on urban emigration and the environment.

Under current conditions, less than 23% of tropical soils in America can support agricultural activities without provoking further damage to the ecosystems.

CURRENT SITUATION OF AGRICULTURAL AND LIVESTOCK PRODUCTION

Intensification of agriculture

The intensification of agricultural exploitation 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 trophic 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 average, agricultural growth rates during the 1980's were lower than population growth, a situation which directly affects the security of 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, the balance of payments and the external debt.

CURRENT SITUATION OF NATURAL RESOURCES

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.

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

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.

Agricultural growth rates during the 1980's were lower than population growth, a situation which directly affects the security of food supply.

The most striking ecological change in the American tropics has been the rapid and continued conversion of natural forests to alternative land uses. This has a direct impact on biodiversity, erosion and the water cycle.

and flooding in low lying areas, alters coastal ecosystems, pollutes sources of water for human consumption and reduces available oxygen, so affecting aquatic flora and fauna. Inadequate reforestation and poor management of natural regeneration only worsen the situation.

Water quality and quantity 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 are contaminated by agricultural or industrial chemicals, which will affect public health.

Biodiversity loss due to deforestation, and environmental pollution is also a mounting problem. 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 on threatened by their habitat losses.

HUMAN RESOURCE PROBLEMS

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 does not only depend 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.

The competitive ability of a country no longer depends solely on its wealth of resources but also on the effective introduction of production into international markets, the scope for adopting new technologies and the ability to quickly adapt to changes in demand or technology. This new situation calls for a suitably trained workforce.

The type of training needed to meet new demands has not been developed in the Iberoamerican region.

There is a pressing need to educate human resources in the new development paradigm. This must cover management, technical and field training so as to meet demands for increased production and renewable, natural resource management with up-to-date knowledge and a pragmatic attitude towards the social and institutional tasks that must be developed.

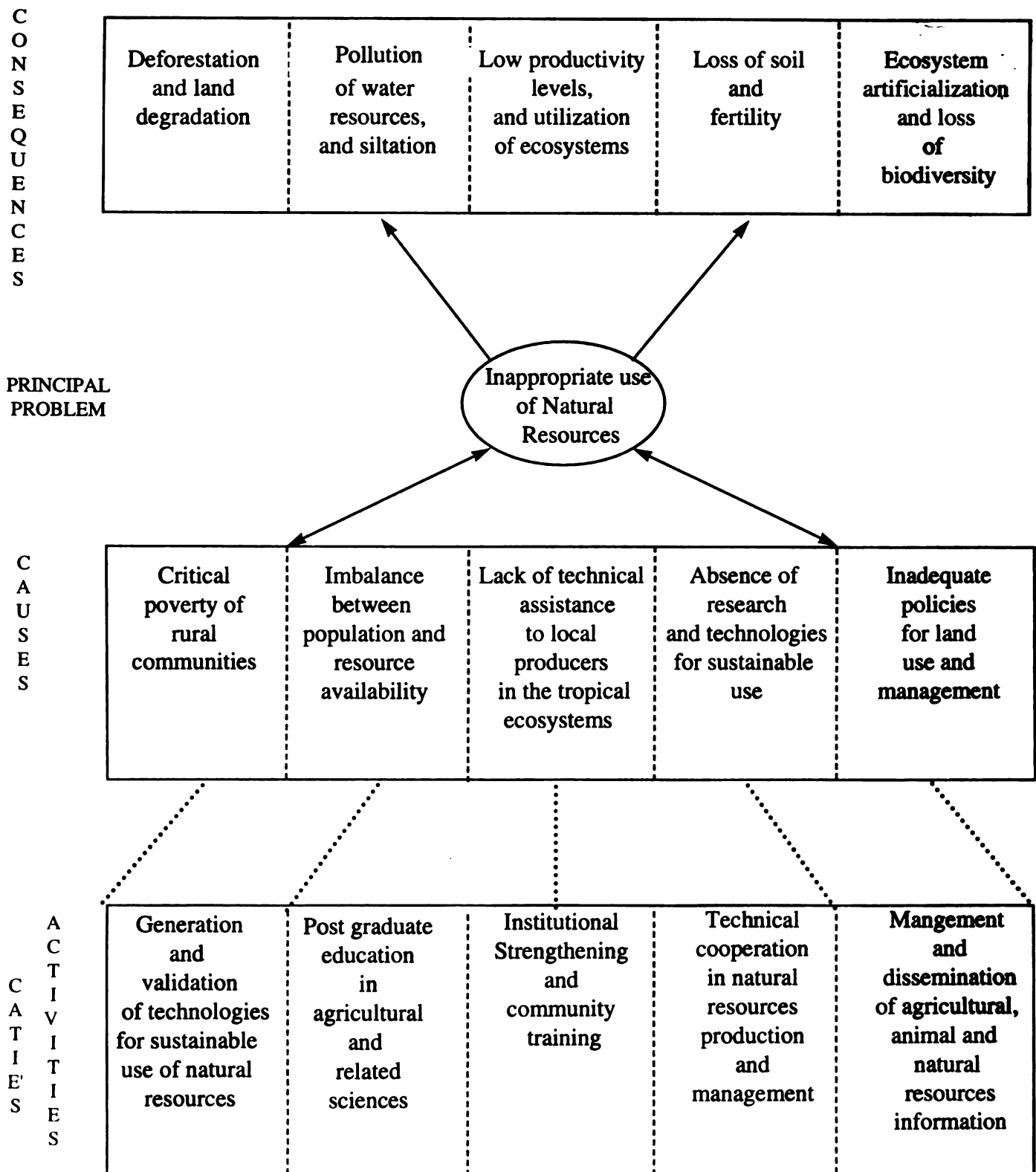


Figure 1. Nature of the problem and CATIE's priorities for action.

CATIE: MEETING ITS OBLIGATIONS AND MANDATE

CATIE's MANDATE AND MISSION

CATIE's mandate was established in Chapter 1, Clause 1 of the Constitutional Contract approved by the Inter-American Board of Agriculture (JIA). It states that CATIE is a civil association, with power of attorney, whose aim is to conduct research and postgraduate education in agriculture, animal husbandry and natural resource sciences to benefit Member States of the Inter American Institute for Cooperation on Agriculture.

Within the framework of this mandate, CATIE seeks to:

Stimulate and promote research and education in agricultural and related sciences for development, conservation and sustainable use of natural resources in the American tropics to improve the well-being of mankind.

OBJECTIVES

The Center's general objective is to:

Establish and generate research, education and technical cooperation programs which contribute to the solution of socioeconomic and agroecological problems in the American tropics regarding the sustainable development of agricultural and forestry production, natural resource management, conservation and development for the benefit of the community.

Specific objectives:

- a. To generate and validate technological practices for agricultural production and natural resource management which are economically feasible, socially and culturally acceptable and environmentally sustainable.
- b. Prepare professionals at postgraduate level to contribute to the development of knowledge and execution of programs conducive to the solution of the socioeconomic and agroecological problems in tropical America.
- c. Promote proficiency in technological practices developed through institutional collaboration and diffusion to end users.
- d. Disseminate the information generated and stimulate the adoption of new technological practices.

STRATEGIC FRAMEWORK

CATIE is aware that its future activities must be concentrated in fewer areas but with greater depth and continuity. CATIE also recognizes that its mandate requires it to answer a great number of questions, but that its action will address a few well-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 Master and Doctorate level, and through the work of CATIE's scientist/professors.

CATIE's PRIORITIES

Following from its mission and objectives, CATIE has introduced the following priorities for the 1990's:

Sustainable agricultural development and the conservation of natural resources in fragile ecosystems, particularly those where small and medium sized farmers apply production systems in the American tropics.

The criteria used to select this priority to carry out CATIE's mission and objectives are:

1. *Urgency.* Member countries and the international community have expressed an urgent need and demand for action.
2. *Economy of efforts.* Collaboration with national, international and regional institutions and organizations, both public and private, will minimize duplication of efforts and increase the effectiveness of actions.
3. *Institutional dimension.* A rational concentration of the Center's efforts according to its traditions, comparative advantages and strengths.
4. *Continuity.* Stability and durability for CATIE programs and a strengthening of its comparative advantages.

These criteria endorse CATIE's institutional priority. Sustainable development has, in effect, been inherent to all the Center's work since its foundation, and is now even more critical in view of the accelerated degradation of land and natural resources in general. Given that this destruction is mostly taking place in fragile ecosystems, a decision to reverse this situation means working with threatened resources as well as the production systems of the local communities.

Critical priority areas suffer inappropriate land use mainly through population pressure by marginal communities. Beneficiaries of the priority should, therefore, not only include national institutions and organizations but also the producers in the affected ecosystems.

This priority has great significance for the American tropics and represents a challenge for CATIE. The Center's interest in fragile ecosystems is neither new nor extemporized. CATIE has over a decade's experience working in degraded plains, hillsides, primary and secondary humid natural forest and wetlands.

In operative terms (Figure 2) CATIE's priorities are directed towards problem solving and improving the standard of living of end

Sustainable development has been inherent in the Center's work since its foundation and is now even more critical in view of the accelerated degradation of land and natural resources in general.

Beneficiaries of the priority will include not only national institutions and organizations but also the inhabitants of affected ecosystems.

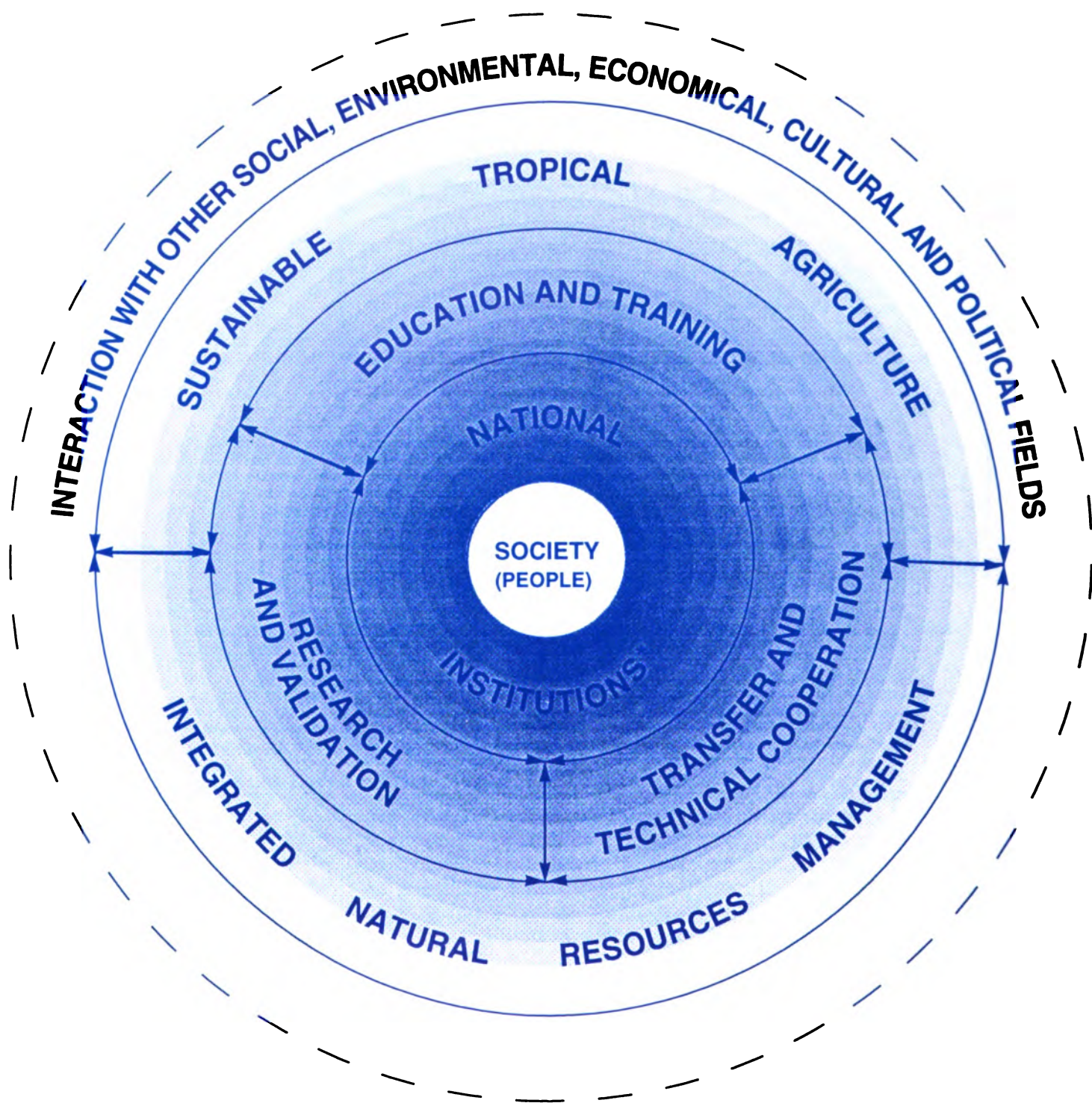


Figure 2. Focus of CATIE's activities during the last decade of the millennium and thereafter.

* Includes both the private and public sector.

users of technologies generated and promoted by the Center. Institutional beneficiaries should include end users as well as private or public institutions that affect the priority ecosystems. CATIE's activities will seek to achieve sustainable development for these beneficiaries through research, education and technology transfer.

Education includes postgraduate studies and short courses for training or specialization. Research, whether basic, strategic, adaptive or applied, is complemented by transference, minimizing the time between technology generation, validation, adoption and diffusion of the practices.

These activities are divided into two program areas: sustainable tropical agriculture and natural resource management. This constitutes a tangible way of keeping production and conservation activities together. In this way, the interactions of economic, social, cultural, and biophysical variables on management and agricultural practices will not be overlooked.

CATIE's ACTIVITIES

CATIE's activities are developed in three basic, interrelated areas:

- *Research.* Research covers the fields of agriculture and natural resources in the member countries through a multidisciplinary approach aimed at achieving sustainability and development.

- *Education and Training.* The teaching-learning process takes place within the context of a postgraduate program and training courses above all targeting professionals within the continent. It has an integrated focus on biophysical, social, business and ecological subjects.

- *Transfer, technical cooperation and communications.* This activity primarily affects member countries and subsequently other countries in the region. Its purpose is to establish mutual collaboration with national, private and governmental institutions of higher education and research and development in agriculture and natural resources. It also aims to rapidly disseminate the most valuable achievements in research and education for immediate adoption by end users.

CATIE possesses recognized experience in production systems in degraded areas on plains, hillsides, primary and secondary humid natural forest and wetlands.

Activities are divided into two program areas: sustainable tropical agriculture and natural resource management. This constitutes a tangible way of fulfilling the aim of keeping production and conservation together.

CATIE's PROGRAMS

To carry out its objectives, CATIE is organized in two main research programs: Integrated Natural Resource Management and Sustainable Tropical Agriculture. According to the concept of sustainable development, there is a continual interdependence between the generation of new technology and proficiency in its use. Following from this, CATIE has a third program, Education for Development and Conservation, which is closely linked to the previous two.

By means of these programs, CATIE has demonstrated comparative advantages over other Latin American and Caribbean institutions which focus on the main problems in tropical America.

SUSTAINABLE TROPICAL AGRICULTURE (PATS)

PATS addresses the need for greater productivity and thus increased agricultural production along with conservation of the ecological systems where these production activities take place. It is justified by increased demand for food and services by a growing population. Its purpose is to mitigate socioeconomic needs, particularly those of marginal communities, which impact fragile ecosystems in tropical America.

The Sustainable Tropical Agriculture Program addresses the need for greater productivity and thus increased agricultural production along with conservation of ecological systems where this activity takes place.



CATIE is a pioneer in the field of agroforestry, having begun research in 1953.

Soil-crop-tree-human, and soil-pasture-tree-animal-human interactions will receive special attention through this line of work.

The Program objective is to:

Generate, validate and promote technological options that can increase productivity through sustainable production systems that result in the sustainable use of natural resources and a reduction in social and market pressures on ecosystems in the American tropics.

The Program fulfills its commitment through three lines of work and their respective technical units: Agroforestry Systems, Tropical Crops Systems and Plant Protection Systems. These three components have been identified as having high priority in the region and each represents an area in which the Center excels.

Agroforestry Systems (AS)

CATIE is a pioneer in the agroforestry field and collaborates closely with organizations such as ICRAF. Agroforestry systems consist of at least two plant species, one a perennial fuelwood 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 in tropical America.

Agroforestry research in CATIE is aimed at the evaluation of agroforestry systems and the selection of trees to use in those systems. The productive and economic response of the systems is studied, determining and interpreting interactions between its components (crops, trees, pasture, light, nutrients, macro and micro fauna, cattle and soils) and its users. AS works with existing agroforestry systems (coffee and cacao with shade, taungya and silvopastoral systems) and new systems



(annual food crops, support systems) through long term experiments on experimental stations, on farms owned by innovative producers and in traditional systems that have existed in the countries for centuries.

Soil-crop-tree-human and soil-pasture-tree-animal-human interactions will receive special attention through this line of work. Priority will be given to the identification and characterization of genetic resources (in ruminants and foraging species) adapted to the restrictive conditions prevalent in tropical America ecosystems. Germplasm banks for *ex-situ* and *in-situ* conservation of genetic resources (plant and animal) identified as promising for the development of sustainable animal production systems will be maintained. Improved technology generation will be sought for important agroforestry and agrosilvopastoral systems for small and medium producers.

Tropical Crops Systems (TCS)

Over the last two decades the appearance of new technologies, replacement of local cultivars, exploitation of new areas for growing crops together with changes in techniques for cropping and conserving have resulted in an *accelerated and profound genetic erosion* of crop species and wild relatives with possible potential use.

These genetic resources are limited and endangered. They provide a source of raw material or genes which, when used in genetic improvement programs, can produce new cultivars adapted to different environmental conditions. The majority are found scattered in natural populations of wild plants and in unimproved local crops. They have generally been preserved or selected over many years under natural conditions or used by farmers because of their adaptation, resistance to pests or disease or, in some cases, because of their quality.



Improved technology generation of important agroforestry and agrosilvopastoral systems for small and medium producers in marginal areas will be sought.

The appearance of new technology, replacement of local cultivars, exploitation of new cropping areas together with changes in cropping techniques and conservation have resulted in an accelerated and profound genetic erosion of crop species within CATIE's member countries.

Phylogenetic resources are a component that safeguards conservation and supports agricultural development in the member countries.

Biotechnology offers alternatives for solving problems affecting the community, including food, health, the environment and natural resource conservation.

Emphasis will be placed on low and ultra-low temperature conservation techniques (cryopreservation) for crops such as coffee, cacao, bananas, plantain and endangered species that are of use to the region.

Under the current Strategic Plan, *Phylogenetic resources will be a component that safeguards conservation and supports agricultural development in the member countries.* CATIE will, therefore, conserve the Phylogenetic resources of economic importance and introduce valuable genotypes that are important for regional agriculture. CATIE will also strengthen its collaboration with institutions such as IPGRI, INIBAP, CIRAD, IICA, Pennsylvania State University and national institutions in the member countries.

Biotechnology offers alternatives for solving problems affecting the community including food, health, the environment and natural resource conservation. When applied to agriculture, it covers plant tissue culture, molecular biology, and genetic engineering. These techniques, in particular the first two, are used for rapid propagation of selected materials free from environmental influences. They are also important for the conservation and exchange of pathogen-free germplasm.

CATIE promotes studies of medium and long term *in vitro* storage as a complement to living collections of species with recalcitrant seeds or vegetative propagation. These can be expensive and subject to threat from pests, diseases or adverse environmental conditions. Emphasis is placed on low and ultra-low temperature conservation (cryopreservation) for crops such as coffee, cacao, bananas, plantain and endangered species that are of use to the region.

In vitro multiplication is equally important as a strategy for rapid propagation of superior genotypes and for facilitating and accelerating their evaluation, adoption and diffusion. For this reason, improved multiplication methods are being studied for coffee, bananas, plantain, forest species and others which show promise for applying the methodology to a number of other species within the genus.

Somatic embryo genesis of tissues or isolated cells forms the basis for CATIE's genetic engineering work to produce genetically improved plants.

Plant Protection Systems (PPS)

Agricultural pest management (including insects, pathogens, nematodes, weeds, rodents and birds) is currently characterized by the predominant use 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 into primary pests, development of resistant strains, reduction in number of pollinators, wildlife mortality, degradation of the productive capacity of some soils, acute work-related poisoning, chronic poisoning of consumers through water pol-

lution and residues in food and economic losses through unnecessarily elevated production costs or rejection of export products contaminated with residues.

CATIE is a pioneer in the search for solutions to these problems. 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.

Nevertheless, it is unrealistic to expect that pesticides will be replaced in the short term as the main tool for pest control. However, a substantial impact can be made on regional agriculture and rural community well-being along with the health of the population in general, by educating producers about correct, safe and rational pesticide use.

As in the past, special attention will be given to stimulating collaboration with organizations in this area such as NRI, NORAD, ASDI, USAID, EPA, OIRSA and North American and European universities.

The program is aware that many management practices used in production systems in fragile ecosystems have a negative impact on the environment and natural resources. For this reason, CATIE's challenge, through this program, is to promote technologies and production systems capable of maintaining and even eventually increasing productivity in degraded tropical American ecosystems, without affecting the environment.

CATIE is a pioneer in the search for solutions to problems related to the effects of agrochemicals on soil, water, biodiversity and man.

CATIE's challenge through this program consists of promoting technologies and production systems that can maintain and even increase productivity in degraded ecosystems of tropical America without affecting the environment.



This program seeks solutions to the rapid and continued conversion of natural forest to other uses, resulting from economic and demographic pressures.

The purpose of this area is to develop forest management systems that are ecologically sustainable, economically viable, socially acceptable and applicable to different types of forest

INTEGRATED NATURAL RESOURCE MANAGEMENT (MIREN)

The Integrated Natural Resource Management Program (MIREN) seeks *solutions* to the rapid and continued conversion of natural forest to other uses, resulting from economic and demographic pressures. Land degradation, fertility loss, soil erosion and qualitative and quantitative changes to the water cycle and biodiversity are just a few of the most outstanding biophysical problems affecting rural poverty in CATIE's mandate region.

The Program's main emphasis is on the interaction of natural resources (water, soil, biodiversity) with each other and with the social sector that uses them. It seeks viable options and attempts to establish precedents on what should or should not be done.

The general objective of INREM is:

To generate, validate and promote appropriate technologies for natural resource management, conservation and sustainable use, with the social sectors that are involved.

The Program has four work areas, each with technical units to manage and execute specific projects. These areas are: Tropical Forest Management and Silviculture, Biodiversity Management and Conservation and Watershed Management. The fourth area, Production and Conservation Economics serves both CATIE's research programs.

The member countries have selected these areas as important priorities in which the Center has a long-standing tradition in tropical America.

Tropical Forest Management and Silviculture (TF)

Over the past 50 years, CATIE has acquired a clear leadership in research, demonstration, education and training in *tropical forest management and silviculture*. The strategic purpose of this area is to develop forest management systems that are ecologically sustainable, economically attractive, socially acceptable and can be applied to different types of forest. Cooperation with institutions such as CIFOR, IITF, ITTO, and FAO will receive particular attention.

The following technical units have been set up to carry out the area's aims:

*** Natural forest.** Technical aspects of tropical forest management are not new to Latin America. However, they are not well known nor taught sufficiently. Before these techniques can be applied so as to benefit the economies and raise living standards of rural communities, they must be shown to be ecologically sustainable, socially and culturally acceptable and economically viable. This is the only way to raise public awareness to create a political climate favorable for legislative change and change the attitude of those who use the forest.

This program unit will attempt to consolidate research, demonstration, technical assistance, education and dissemination to make a greater impact on participants at several decision levels. Land use options will be generated through the development and adoption of forest management systems.

*** Plantations (Multiple-use trees).** Since 1980 CATIE has strengthened and promoted multiple-use tree silviculture. An analysis of the problem of natural forest destruction and demand for forest products in Central America has revealed a need for timber, fuelwood, forage and poles amongst others. For this reason silviculture, socioeconomics and forestry extension activities are being conducted in demonstration areas with different fragile conditions in CATIE's member countries.

*** Genetic resources.** A resource cannot be used efficiently if its fundamental characteristics are unknown or if it is being destroyed. Characterization and conservation of forestry genetic resources are an indispensable condition for the improvement and optimum use of resources in the short, medium and long term.

Technical aspects of tropical forest management are not new in Latin America. However, they are not well known nor taught sufficiently.

Since 1980, CATIE has strengthened and promoted the silviculture of multiple use trees.

Characterization and conservation of forestry genetic resources are an indispensable condition for the improvement and the optimum use of resources in the short, medium and long term.



The biodiversity of the American tropics is, at best, under-utilized and, generally speaking, not managed.

The identification of superior genotypes through field trials is fundamental to genetic improvement. The term "genotype" is used in this context in its broadest sense to cover any replicable genetic unit such as provenance, family or clone.

Biodiversity Management and Conservation (BMC)

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, insufficient for establishing guidelines for biodiversity utilization. These have only rarely been complemented by the ethnobotanical or economic botany studies which would be needed for developing appropriate management of biodiversity products.

CATIE takes an active interest in the utilization of biodiversity resources by local communities, with the understanding that general resource deterioration will be reduced if biodiversity and tropical ecosystems can contribute to social and economic development. Work will concentrate on buffer zones or areas of multiple use in biosphere reserves, both for planning and implementing field activities.

Existing collaboration with IUCN and WWF will be especially valuable for this.

This area of work has two technical units:

* ***Conservation for development***. This unit conducts research on tropical biodiversity utilization by indigenous communities and others. Ethnobotanical studies complement economic botany studies and include the determination of those biological characteristics which add



value to resources (attractiveness, medicinal or insecticidal properties, potential for handicrafts or others), growth rate and productivity (in biomass and commercially valuable parts), most efficient propagation methods, associations and relationships with other species under natural conditions, development of production or extraction methods that are sustainable under natural conditions and identification and characterization of sources of genetic variability.

Coastal wetlands, their socio-economic, political, cultural, and environmental aspects, especially methodologies for people participation, and active role in their management, and use will be emphasized.

*** Protected areas management.** Since the socio-political situation of each member country seriously limits the effectiveness of national conservation efforts, this unit focuses on technical assistance. Technical support is given to the consolidation of protected area systems, biodiversity conservation in national parks and wilderness areas, training human resources and promoting methodologies and techniques for planning and management of these areas.

Watershed Management (WM)

Degradation of watersheds is a problem all the member countries have in common. The creation of conditions for public, private, national and international institutions to generate, transfer and apply the necessary information and technology for sustainable natural resource use is of great importance to the Center.

Inappropriate land use in watersheds creates serious social and economic costs and threatens agriculture, sources of potable water, natural runoff control, navigation and tourism. For this reason, CATIE places special emphasis on *hillside rehabilitation*, particularly the production systems carried out on them. Collaboration with CIAT, IICA and PRODERE in hillside production systems is of fundamental importance to CATIE.

The two technical units in this area are:

*** Watershed rehabilitation.** This area places emphasis on the rehabilitation of hillsides under production systems. It produces the appropriate mechanisms to help institutions move from the watershed planning process to execute activities for improving deteriorated hillside areas. The unit researches, validates, evaluates and disseminates technological practices for appropriate natural resource use as indicators of sustainable agriculture in fragile ecosystems.

Geographic Information Systems (GIS). This unit is a custodial center for data generated on remote sensors and available digital information. It also offers processing services to users on demand. In this way it makes new data processing and analysis techniques available and

CATIE will study the utilization of biodiversity resources by local communities, with the understanding that as biodiversity and tropical ecosystems contribute to social and economic development, general resource deterioration will be reduced

Support is given to consolidating protected area systems in national parks, reserves and wilderness areas.

Inappropriate land use gives rise to considerable social and economic costs and threatens the sustainability of agriculture.

Current and potential land use and monitoring harvests and natural resources will assist decision making for sustainable agriculture.

An integrated approach to development is needed so that technical support does not oppose or become offset by economic, social, cultural, institutional or managerial limitations.

provides the necessary training and technical assistance to use this tool for decision making, control and follow-up of agricultural and natural resource activities.

Production and Conservation Economics (PCE)

With this work area, CATIE is setting a new course and making a contribution to the discovery of socioeconomic, cultural and managerial factors which affect natural resource management as a basis for production.



The importance of agriculture and renewable natural resources in the economies of American countries makes them a linchpin for sustainable development. Consequently, it is necessary to *focus development on an integrated approach* so that technological support does not oppose or become offset by economic, social, cultural, institutional or managerial limitations. This area analyzes the *conditioning effect* of these factors on sustainable development as well as the need to incorporate them into *technology generation and transfer*.

Technical units in this work area are developed in terms of production and conservation economic systems, social organization and mobilization systems and resource management.

PCE will conduct research and validation in 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, identify and find mechanisms to make the principle "the polluter pays" a reality for the most important economic

activities and form associations with the conservation movement to make this economically feasible.

Members of the MIREN Program are aware that land degradation and resultant biodiversity loss are generally irreversible processes. If concrete and timely actions are not taken to solve this problem, it will soon be too late. Through this program, CATIE will strive to halt degradation, attain conservation and improve the well-being of the Region's population.

EDUCATION FOR DEVELOPMENT AND CONSERVATION (EDECO)

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 previous two programs. Its objective is:

To develop, specialize and train human resources with the necessary attitudes, abilities and knowledge to promote and implement sustainable natural resource management, conservation and use in the American tropics, with the participation of the community.

The program has three fundamental lines of work: formal post-graduate education, training and communication and information systems.

Postgraduate Studies

Sustainable agriculture and natural resource management and conservation call for suitably qualified staff and decision makers. There is a pressing need for the training of 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 unequalled.

The Center has fulfilled its continental mandate through *51 years of uninterrupted postgraduate education*. Over 1100 students have graduated (1992 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

Through this program, CATIE will strive to halt degradation, achieve conservation and improve the well-being of the Region's population.

Development and promotion of technological options and practices suitable for tropical ecosystem use faces the serious problem of a lack of human resources trained in this field.

The Center has fulfilled its continental mandate through 51 years of uninterrupted postgraduate education.

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 that characterizes the institutions is reflected in the education environment.

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 has been subject to a *curricular development* 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 correspond*. Interdependence, feedback and coherence of institutional activities is of utmost importance. As an example of this, all scholarship students are named Research Assistants to CATIE's education faculty.

The program currently offers a *Magister Scientiae* in Sustainable Agricultural Production Systems, emphasizing Tropical Crops, Agroforestry Systems and Plant Protection and also in Integrated Natural Resource Management, emphasizing Tropical Forest Management, Protected Areas Management and Watershed Management. Conservation Economics will be a new option in 1995.

The Masters program lasts two years. During the first year, students accumulate a minimum of 40 quarterly credits. The second year follows a tutorial system and is dedicated exclusively to research or validation resulting in a thesis. This may be done in the Center or, preferably, in the student's home country. In this way the student can make a direct and significant contribution to his own country whilst remaining integrated in the research work of the Center.

The alumni are CATIE's achievement through excellence. Alumni leave the Center with the scientific, managerial and field skills to successfully meet the demands for increased production and 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*".

Given the complexity of the region and the strengths of the Postgraduate School, CATIE believes that a doctorate degree should also be offered.

The Doctorate Program will cater to regional needs and will have eventual collaboration from prestigious universities outside the region. It will begin in 1995, offering doctorate degrees in the Center's two main strategic research areas.

The program will also endeavor to encourage an exchange program for doctorate and masters level students and for visiting professors on sabbatical, from north to south and south to south.

Training and Outreach

Training is a teaching and learning process which aims to encourage the acquisition of new knowledge and abilities and the modification of attitudes to 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 space of time, they equip a significant number of personnel with an effective tool for mastering new technologies and production and conservation practices.

This diversity guarantees a free exchange and renewal of methodologies, ideas and achievements in the fields of agriculture and natural resources to all countries in the humid tropics.

CATIE's education program has been subject to a curricular development to ensure that it is up to date and "state of the art" for each area of specialization.

Given the complexity of the region and the strengths of the Postgraduate School, CATIE believes that a doctorate degree should also be offered.

The strategic value of CATIE's training courses lies in their effect on strengthening the operational level of regional and national institutions.

Work with nodal producers, producers' associations and natural resource users will be strengthened to increase successful community involvement in the use and sustainable management of the productive base and sustainably increase agricultural and forestry production.



CATIE trains approximately 1200 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. The courses cover specific areas of learning at different academic levels.

CATIE will also train decision-makers of all trades, community leaders, social workers, and other "change agents" to enable them to contribute towards a sustainable development.

As part of this plan, this work area defines two types of course: *joint courses* and *strategic courses*. The former are training courses which are offered to fulfill the particular needs of national institutions and projects. Strategic courses are designed to maintain the continuity of the institute's learning within its strengths and interests.

It is hoped that the number of participants will double in 1997 and treble by the year 2000, with Latin American and Caribbean participation.

Extension activities will concentrate on work with nodal producers, producers' associations and natural resource users. This will increase successful community involvement in the sustainable management and use of the productive base and sustainably increase agricultural and forestry production.

Complementarity and collaboration with IICA is a very high priority in this area.

Communication and information systems.

Access to information and its management currently signify power and this, in the form of technical knowledge, is essential for sustainable development in tropical America. This line of work aims to disseminate

research results and link the education process with research. At the same time information banks will be set up containing the results of research in tropical agriculture and natural resource management. This will facilitate access to the latest advances on a worldwide level and make results from CATIE and other institutions, both inside and outside the region, available to the Center's users and national and international institutions.

To achieve this aim, the Center has the Orton Library and a modern computer center which offers its services to students, teaching staff and CATIE users.

In 1993, the first Scientific Week was held. This is an international event where scientific and educational advances are presented for rapid dissemination to the countries of tropical America.

The challenge of sustainability and the new regional reality have made access to information and the training of human resources essential to assume and implement development tasks. This challenge is increased by the urgency for finding a new graduate profile. CATIE's graduates must have the skills to respond to the technological needs of sustainable development and the appropriate attitude to respond to situations in regional institutions and the demands and well being of the community.

The following periodicals produced by CATIE will be reinforced by this line of work: *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, Bulletin for Pesticides Registered in Non-Traditional Export Crops, and the Scientific Series leading with Multiple-Use Trees, Tropical Forest Management and Silviculture, Agroforestry Systems, Integrated Pest Management and Biotechnology and Conservation for Development, will be enhanced.

Texts, proceedings of conferences and workshops, informative bulletins and networks such as REDCA and REMERFI will continue to be published with the support of this Area.

Access to and management of information signify power which, in the form of technical knowledge, is essential for achieving sustainable development in tropical America.

CATIE graduates must have the skills to respond to the technological needs of sustainable development and the appropriate attitudes to respond to situations in regional institutions and the demands and well-being of the community.

INSTITUTIONAL IMPLEMENTATION AND STRATEGIES

STRATEGIC MANAGEMENT

Just 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 and education, and not the reverse.

Strategic management is essential for this plan's execution.

The characteristic strategies for strategic management are:

To establish a flexible, efficient management style that is open to scrutiny for financial resource management and allocation 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 technical postgraduate, 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 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.

ACTION PLANS

Each Program is responsible for developing and executing an *Action Plan*, complementing CATIE's Strategic Plan. These plans

Action plans will allow guidance, monitoring and evaluation of the Strategic Plan's execution and fulfillment of its Programs, Areas and Projects. These will be an integral part of the Strategic Plan

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 3 shows the operations used to update work plans and the Strategic Plan in greater detail.

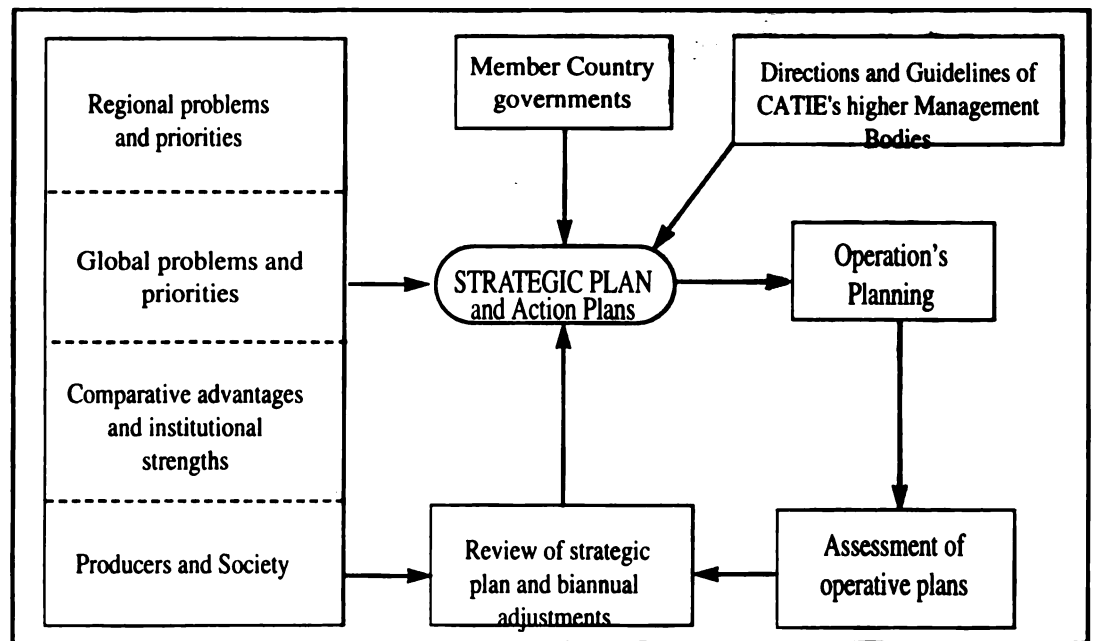
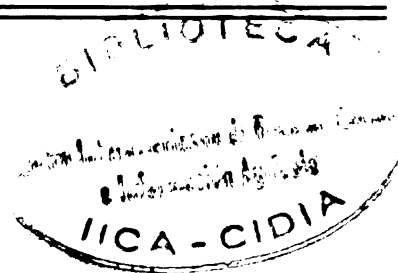


Figure 3. The Strategic plan arises from prioritization of the most pressing world-wide and regional problems. End users and national governments participate within CATIE's mandate taking into account comparative advantages and institutional strengths.

In addition, profiles, project proposals and pre-proposals based on work plans will be submitted to donor and cooperation agencies for consideration. CATIE will seek a balance of activities between countries, in scientific and technological advancement and human resource development needed to achieve sustainability.



OPERATIONAL METHODS

The Central Headquarters will act as a focal point for implementing the Strategic Plan. This means 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 field level and in technology generation and ii) as a liason center for tropical America, the execution of production, education, training and conservation aspects with institutions worldwide, using CATIE as a liason center for tropical America.

CATIE has a collaborative relationship at international institution level with AVRDC, CADESCA, CCAD, CARDI, CEPAL, CIAT, CIFOR, CIMMYT, CIRAD, CORECA, EARTH COUNCIL, FAO, ICRAF, IDB, IFPRI, IICA, INCAE, INIBAP, IPGRI, ISNAR, ITTO, IUCN, NRI, OIF, OIRSA, ORSTOM, PROCITROPICOS, PRODERE, PROMECAFE, RISPAL, UDA, UNDP, UNEP, WB, WRI 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 cooperation 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					
PROGRAM	AREA	RESEARCH AND VALIDATION	EDUCATION AND TRAINING	TECHNICAL COOPERATION	POLICY AND INSTITUTIONAL STRENGTH.
SUSTAINABLE	TROPICAL CROP SYSTEMS	CIRAD CIAT AVRDC FAO INIBAP FIA CARIPO IFRM ORSTOM CIMMYT NATIONAL INST.	CORNELL U. U. WAGENINGEN CP-CHAMPINGO REDCA INBIO OAS IICA	NATIONAL INST. PROMECAE REMIERI PROCIPTROPICOS ISNARI	IICA IDB NGO's WB IFPRI
		NRI FIIA AVRDC OIRSA CARBI EPA USDA CIAT NATIONAL INST. CRSP-CONSORTIUM	EAP CORNELL U. CP-CHAMPINGO REDCA OAS IICA	NATIONAL INST. CORNEIL U. PROD. ASSNS. APHIS EPA ISNARI	IICA CORECA OIRSA IFPRI
TROPICAL	PLANT PROTECTION	ICRAF REDCA OTS USA NATIONAL INST. NFTA UFLA ISRIC CIAT OPI-OXFORD	UACH EAP U. LAVAL OAS U. PAZ IICA WISCONSIN U. REDCA	NATIONAL INST. PROCIPTROPICOS ISNARI	IICA NGO's IDB CABEI IFPRI
		PRODUCTION AND CONSERVATION ECONOMICS	MARYLAND U. IICA INCAE REDCA OAS	IICA NATIONAL INST. NGO's	IICA IDB CABEI WB
INTEGRATED	SILVICULTURE AND MANAGEMENT OF TROPICAL FORESTS	CIFOR PART-CA CIRAD ITTO GEF PNUMA IITE USDAPFS UNDP FAO NATIONAL INST. OPI-OXFORD	OXFORD U. INCAE REDCA INBIO OAS IICA	EARTH COUNCIL PROCIPTROPICOS CCAD NATIONAL INST.	IICA IDB CABEI WB NGO's.
		MANAGEMENT	UNESCO IUCN CI CCT WWF NGO's REDCA INBIO OAS IICA	EARTH COUNCIL CCAD NATIONAL INST. NGO's.	IICA UNEP WRI
NATURAL	CONSERVATION AND MANAGEMENT OF BIODIVERSITY	WWF IUCN CI CCT WCS TNC OTS ITTO ISNE UNDP NATIONAL INST.	UNESCO IUCN WWF NGO's REDCA INBIO OAS IICA	EARTH COUNCIL CCAD NATIONAL INST. NGO's.	IICA UNEP WRI
		RESOURCES	FAO IICA ORSTOM NGO's CLARK U. UNEP UNDP	UNESCO IUCN REDCA IICA OAS	EARTH COUNCIL PRODERE CARE CCAD NATIONAL INST. NGO's. UNDP. FAO. WFP
NATURAL	WATERSHED MANAGEMENT (WATER, SOIL AND VEGETATION)	FAO IICA ORSTOM NGO's CLARK U. UNEP UNDP	UNESCO IUCN REDCA IICA OAS	EARTH COUNCIL PRODERE CARE CCAD NATIONAL INST. NGO's. UNDP. FAO. WFP	IICA IDB CABEI

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 liason 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 for the benefit of inhabitants of the tropics.
- c) **Institutional cooperation with CIRAD, NRI, AVRDC, CIAT, ISNAR, and others.** Joint action 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) **Scientific and educational networks such as REDCA, PROMECAFE, PROCITROPICOS and REMERFI.**

Education and training, particularly, are conducted in coordination with the Regional Network for Cooperation in Research, and Higher Education in Agriculture Natural Resource Management, and the Environment. This liases between 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 120 institutions from Central America, the Caribbean, North America, and Europe.

CATIE's collaboration includes close cooperation with *donor organizations*. *Thanks to this cooperation, CATIE has been able to benefit the population, and governments of the 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 donor organizations who have given valuable support in the past and whose continued cooperation is envisaged: USAID/ONARM, CABEI, CIDA, DAAD, DANIDA, DSE, DSO-IO Spain, EU, FINNIDA, GEF, GTZ-BMZ, IDRC, IDB, IFAD, JICA, Korea, MAE France, MOLISV, NORAD, ODA, PROCADES, Republic of China, SAREC, SDC, SIDA, UNDP, UNEP, and WB.

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

The Strategic Plan will be backed by strategic management and expects to receive the support of the international community.

The Foundation for Education and Research in Natural Resource Development and Conservation in the American Tropics (FUNDATROPICOS) has been set up with the main objective of receiving funds to help run the Center and achieve financial sustainability.

CAPITAL DEVELOPMENT

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

The most important points of this scheme are:

- a) the creation of professorships (Chairs) financed by international institutions, the private sector, and foundations.
- b) negotiation of the permanent assignment of visiting professors and scientist-professors, paid for by various bodies, whose objectives are similar to those of CATIE.
- c) permanent sponsorship of postgraduate and training scholarships and permanent financing of specific activities in the Center by the international community .
- d) creation of an endowment fund managed by a foundation (FUNDATROPICOS) at CATIE for the long term investment of at least US\$100 million. The interest will finance the Center.
- e) sale of services such as accommodation, consultancies, publications, software, technical assistance at market prices.
- f) commercial production on farms using the latest advances in agricultural sustainability at the same time as earning income.
- 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.

Financial security is essential to support basic research, education, and cooperation programs so allowing the Center to develop this Strategic Plan, complementing 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.

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

RESOURCE NEEDS AND ALLOCATION

Financial resources

Because of its current financial scheme, CATIE operates with a chronically small core budget and depends on fixed-term projects to carry out the majority of its actions. For this reason, an initial objective of the Plan is to attract greater resources for the core budget to guarantee continuity and maintain the excellent pool of human resources needed for research and graduate education.

As mentioned earlier, CATIE is consolidating the three programs: education, agricultural research and natural resource research. 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, only 25% of financing comes from the core budget. CATIE's strategy is to change the balance of financial support by 2002 to 50% from core budget and 50% from projects. This change is necessary to fulfill the Center's mission and objectives. As well as the endowment fund managed by FUNDATROPICOS, long term support for critical program areas will also be sought.

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 70% of this budget. Transfer and technical cooperation aspects are included in each program.

CATIE is aware that donor agencies, operating with funds from 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 reverse this situation and see that administrative management expenditure is gradually reduced and funds for education and research increased until they amount to at least two thirds of CATIE's total core budget. The proportion should be

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

In 1993 75% of CATIE financing originated from donors and only 25% from core budget. The Center is currently working to correct this situation to arrive at a more equitable distribution between the two.

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

25% for administration and management and production activities, and 70% for research education outreach, transfer, and technical cooperation, by the year 2002.

The minimum annual core budget needed for the Center in constant 1993 dollars is US\$9.0 million. With this sum, the Center can carry out relevant regional activities with a critical mass of 30 international staff members at Ph.D. level, 40 national staff members either with Ph.D. or M.Sc. level, and 120 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).

Description	Amount (US\$)
PPI and PPN (International and national professionals)	2.8 million
Postgraduate scholarships *	1.2 million
Training courses *	1.0 million
Communications, dissemination, library	1.0 million
Computer Center, Laboratories, and Experimental Areas	1.0 million
Conferences and Seminars	0.5 million
Administration	0.8 million
Maintenance	0.7 million
TOTAL	9.0 million

* Incomes from these activities will finance research

It is expected that the proportion of financial resources from core budget will be only 25% for management and administration and 70% for research and education by the year 2002.

Funds for projects could decrease from the current sum of nearly US\$12 million annually to US\$9 million annually.

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 20% to be achieved in six years (1999).

Human Resources

CATIE's Strategic Plan places high priority on the permanent employment of professionals in the specializations 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 the rest of personnel to achieve a maximum proportion of support personnel: professional personnel of 2:1, 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.

The number of professionals should be increased in relation to the rest of personnel to arrive at a maximum proportion of support personnel: professional personnel of 2:1.

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

PROGRAM	1993	1996	1999	2002
Sustainable Tropical Agriculture ¹	15	26	32	32
Integrated Natural Resource Mgt..	10	18	26	26
Education (Support)	4	5	7	7
High Level Administration ²	5	5	5	5
TOTALS	34	52	70	70

¹ Includes professors and researchers in the Postgraduate School.

² Includes Director General, Deputy Director General, Internal Auditor, General Administrator, and Comptroller.

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 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.

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

IMPACT MONITORING AND EVALUATION

CATIE will spare no efforts to implement the monitoring and continuous assessment of this Strategic Plan. Amongst 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 Ministers Council and formal reviews of the Strategic Plan every two years.

CATIE and its Programs' impact *can be evaluated* at mid-term (1992-1996) through the verifiable indicators set out in each Program's action plan. Special attention will be given 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 the 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.

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

In the long term, the same criteria will guide monitoring and evaluation.

However, it must not be forgotten that the main purpose of this Plan's implementation lies in its impact at 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.

GLOSSARY OF INSTITUTIONAL ABBREVIATIONS

APHIS	American Plant Health Information Service
AVRDC	Asian Vegetable Research and Development Center
CABEI	Central American Bank for Economic Integration
CADESCA	Advisory Committee for Economic and Social Development of Central America
CARDI	Caribbean Agriculture Research and Development Institute
CATIE	Tropical Agricultural 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)
CEPAL	Latin American Economic Commission
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
CIMMYT	International Corn and Wheat Research Center
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, Holland
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
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute

IICA	Inter American 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
ISRIC	International Soil Reference Collection, Wageningen, Holland
ITTO	International Tropical Timber Organization
IUCN	International Union for the Conservation of Nature
JICA	Japan International Cooperation Agency
MAE	External Affairs Ministry, France
MOLISV	Movimento Liberazione e Sviluppo, Italy
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
ONARM	Regional Office for Central American Programs of the US Agency for International Development
ORSTOM	French Office for Overseas Scientific and Technical Research
OTS	Organization for Tropical Studies
OXFORD U.	Oxford University
PAFT-CA	Central America Tropical Forestry Action Plan/Central American Forest Council.
PROCADES	Regional FAO/UNDP/CEPAL Project for Training, Planning, Programming, Agricultural Projects and Rural Development
PROCITROPICOS	Tropical Amazon Science and Technology Program
PRODERE	United Nations Program for Displaced Persons, Repatriates and War Refugees
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 Phytogenetic 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
U.A.WAGENINGEN	Wageningen Agricultural University
U.MARYLAND	University of Maryland
U. CORNELL	Cornell University
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
ULAVAL	Université de Laval
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UPAZ	University for Peace
USAID	US Agency for International Development
USDA	US Department of Agriculture
USDA/FS	USDA Forest Service
UWISCONSIN	University of Wisconsin
WB	World Bank
WFP	World Food Program
WRI	World Resources Institute
WWF	World Wide Fund for Nature

APPENDICES

***INITIAL GUIDELINES FOR THE
ELABORATION OF THE STRATEGIC PLAN***

QUESTIONS TO ORGANIZE A DISCUSSION OF THE STRATEGIC PLAN

MISSION AND OBJECTIVES

1. Is CATIE's mission well defined or too restrictive? Should it refer to "natural resources" without the restrictions of ecosystems?
2. Are general and specific objectives adequately defined given the mission set forth? Given the problems and restrictions which face the region, are the defined specific objectives appropriate?

STRATEGIC FRAMEWORK

3. Are the strategies defined for each major area those most closely in keeping with the proposed objectives? Are the work priorities which will guide CATIE's activities from 1993-2002 sufficiently explicit as they appear in the document?
4. Given the levels of resources and strategies stipulated, are the impacts proposed for CATIE's activities reasonable? Are they obtainable? Which conditional factors should be anticipated? What response strategy or actions to these factors should or could be included in the strategic plan?

CATIE'S PROGRAMS

5. Do the programs set forth reflect the objectives and strategic framework proposed? Are the institution's comparative advantages the most appropriate?
6. Are these adequate instruments to avoid the dissipation of effort which has affected CATIE in the past, as they are presently stated?
7. What should be the balance between the different Programs, between the work areas within each program and between these and educational activities?

IMPLEMENTATION

8. Are the proposed operational modes the most effective, given current objectives and strategies?
9. In light of the role that CATIE should play at the sub-regional level, are the institution's interactions with national organizations adequate?
10. How should the areas of required human and financial resources be emphasized in this document?

CATIE'S COUNCIL OF MINISTERS
(as of September 1, 1994)

Dr. Mario Carvajal, Chairman
Minister of Agriculture and Livestock
Costa Rica

Dr. Russell Garcia
Minister of Agriculture and Fisheries
Belize

Ing. Carlos A. Mejia Alféres
Minister of Agriculture and Livestock
El Salvador

Lic. Luis Arturo del Valle
Minister of Agriculture, Livestock and Food
Guatemala

Dr. Ramón Villeda Bermúdez
Minister of Natural Resources
Honduras

Prof. Carlos Hank González
Secretary of Agriculture and Water Resources
Mexico

Ing. Roberto Rondón Sacasa
Minister of Agriculture and Livestock
Nicaragua

Ing. Carlos Sousa-Lennox
Minister of Agricultural Development
Panama

Lic. Luis Toral
Secretary of State for Agriculture
Dominican Republic

Dr. Ciro Añez Fonseca
Minister of Agriculture and Livestock
Venezuela

Ing. Carlos Aquino G.
Director General, IICA

Dr. Murilo Xavier Flores
President of EMBRAPA
Brazil

Dr. Rubén Guevara Moncada, Ex-Officio Secretary
Director General, CATIE

CATIE'S BOARD OF DIRECTORS
(as of August 31, 1994)

Dr. Frank Bendaña R., Chairman of the Board (1992 - 1996)*
Chairman of the Executive and Finance Committee

Dr. Manoel Malheiros Tourinho, Vice-Chairman of the Board (1992 - 1994)*
Chairman of the Scientific-Academic Committee

Dr. Bjerne Ditlevsen (1992 - 1997)
Director

Dr. William K. Gamble (1992 - 1994)*
Director

Dr. David W. Joslyn (Appointed by IICA's Director General)
Deputy Director General - IICA
(Representative from IICA)

Dr. Whetten Reed (1993 - 1997)**
Director
(Representative from the Inter American Board of Agriculture)

Ing. Willy Loría (1994 - 1997)
Director

Lic. Güido J. Martinelli (1992 - 1994)*
Director

Dr. Thomas M. Yuill (1992 - 1996)*
Director

Ing. Manuel R. Yurrita (1992 - 1994)*
Director

Dr. Rubén Guevara Moncada, Ex-Officio Secretary
Director General CATIE

*** Has option to be reelected by the Board once, for an additional period of three years.**

**** Is elected by the Inter-American Board of Agriculture.**