BIENNIAL REPORT

ON THE ACTIVITIES OF THE TROPICAL AGRICULTURE RESEARCH AND HIGHER EDUCATION CENTER

CATIE

1997 - 1998

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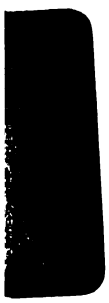

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BIENNIAL REPORT

ON THE ACTIVITIES OF THE TROPICAL AGRICULTURE RESEARCH AND HIGHER EDUCATION CENTER

CATIE

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Tropical Agricultural Research and Higher Education Center
Turrialba, Costa Rica
1999

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PREFACE

The Tropical Agricultural Research and Higher Education Center (CATIE) accumulates more than 50 years of research experience in the areas of agriculture and natural resources management. Although its past research activities have produced outputs of considerable impact in the development of Member Countries, and in particular in Central America, a complete reorganization of research strategies and structures was needed to attain the Center's full output capacity.

The situation of research at CATIE in 1996 could be characterized as having competent research staff members, experience in working with multidisciplinary and interdisciplinary groups, physical infrastructure, including laboratories, computer facilities and experimental fields, partial regional coverage through partners, networks and collaborative research projects, a strong program in education and training that complemented research activities, and a budget structure that allowed the Center to develop its own research Agenda.

However, at that time, the Center's Research Program also suffered from several weaknesses. These included a low output of quality scientific articles published in international scientific journals, low output of strategic research and low impact in developing tools for sustainable development in the region, few genuine research projects (research was funded mainly through development projects), and a loose linkage with the other two institutional Programs, i.e. Education and Outreach. In addition, the Center's research was mainly targeted toward biophysical topics, neglecting proper attention to human dimensions.

Nonetheless, over the past two years, CATIE has greatly improved its research situation. Its Board of Directors approved five fundamental Research Lines, in 1997, which served to prioritize and consolidate the Center's research activities in five concise areas. Presently all research conducted at the Center, as well as most of the research for Graduate theses falls within these five Lines, which were defined through a detailed planning process, taking into account regional priorities, competence of all the actors in the regional research scene, including International Centers, and CATIE's own resources and experience.

The reorganization of the Research Program is already bearing fruits. In fact, the evolution of the number of CATIE research papers in international refereed journals and those listed in the Science Citation Index from 1992 to 1998 show great increase, with figures almost doubling, and attaining levels which are similar to those of international CG System Centers.

In terms of research areas and lines, CATIE's expected status for the year 2003 includes a regional advantage for development of technologies and sustainable production systems for integrated agriculture, agroforestry, forestry and natural resources management. The Center will fill the need for strategic research in natural resources management in the region, addressing issues ranging from global changes and markets to the regional status of natural resources for the well-being of populations at the local level. CATIE will collect, analyze and disseminate

Information relevant to the long-term planning of sustainable development in its Member Countries. This information will be produced and disseminated using advanced technologies and means (GIS, data banks, expert systems, Internet, etc.). Furthermore, it is expected that CATIE will be a leading institution in the utilization of biotechnology for the conservation and improvement of plant genetic resources of selected crop and forest tree species.

In terms of institutional performance, it is expected that CATIE will continue to publish its research findings of international importance in international peer-reviewed journals at a rate of 20 to 30 publications per year. Publications, such as books, manuals and CD-ROMs synthesizing research findings will be produced mainly for Latin American and Caribbean audiences.

Research findings from different areas and disciplines will be integrated and tested under field conditions with the active support of the Outreach Program, in close cooperation with R&D projects and national institutions.

CATIE's Education Program, which in addition to the institution's well known Masters Program, now runs an active Ph.D. Program, benefits from the advances and quality accomplished in research. Agreements for academic collaboration and joint execution of research projects with well known universities throughout the world, confirms that CATIE has reached a stature in a world where globalization and competitivity define the new development paradigm.

Rubén Guevara Moncada
Director General

Executive Summary

In accordance with Clause Nine of the CATIE Charter, the Director General shall submit to the Inter-American Board of Agriculture a biennial report on the work accomplished. This report corresponds to the biennium from 1997 to 1998.

The report analyzes the institutional situation and achievements of the period. It also presents the activities and actions of the Council of Ministers and the Board of Directors as higher bodies created by IABA in 1991 to streamline and strengthen the Center. In the opinion of the General Directorate, the reforms of CATIE's higher administration bodies have fully attained their objectives and the Center is managed flexibly and with an appropriate capacity for response.

The financial statements for 1997 and 1998, which show a satisfactory financial position according to the opinions of the External Auditors, are also presented. Reference is made in this section to the major efforts made in favor of obtaining alternative sources of funding as a result of which the Center's programs have been able to be preserved and even improved, and the CATIE budget has remained stable.

The most important achievements are highlighted. The Education, Research and Outreach Programs were consolidated. The Training Area was separated from the Graduate School and taken under the wing of the Outreach Program. Also the links between the Education Program, and its Graduate School, with the Research Program were strengthened.

Research Lines were defined and prioritized. All of CATIE's numerous research projects, including the students' thesis research, fall under individual Research Lines and have specific assigned personnel and a clearly defined budget. Having the Graduate School linked to the Research Program means that the student research can be better supervised by CATIE's research staff and is completely in line with CATIE's research priorities. The number of papers published in internationally recognized scientific journals increased notably in this biennium.

The Doctoral Program, initiated in 1996, has been strengthened. The agreements for cooperation and joint doctoral programs, initially signed with Colorado State University and the University of Florida, were extended to the University of Hohenhein, the University of Freiburg, the University of Helsinki, the University of Louisiana and Texas A&M.

The strategies and structure of the Outreach Program have been improved. The National Technical Offices and the National Advisory Councils (CAN's) were consolidated. Outreach Lines were defined. The communications systems were improved remarkably: data transmission speed was dramatically increased and the CATIE Web Page was restructured. The Communications and Media Production Areas were also restructured, joining the personnel and resources from various separate areas to create a more efficient and more streamlined unit.

This multi-faceted consolidation effort has strengthened the institution, clarifying overall objectives, and integrating the staff under a common mission and ethic, ensuring that the institution is more flexible and offers a better service to a wider range of beneficiaries both internally and in the member countries.

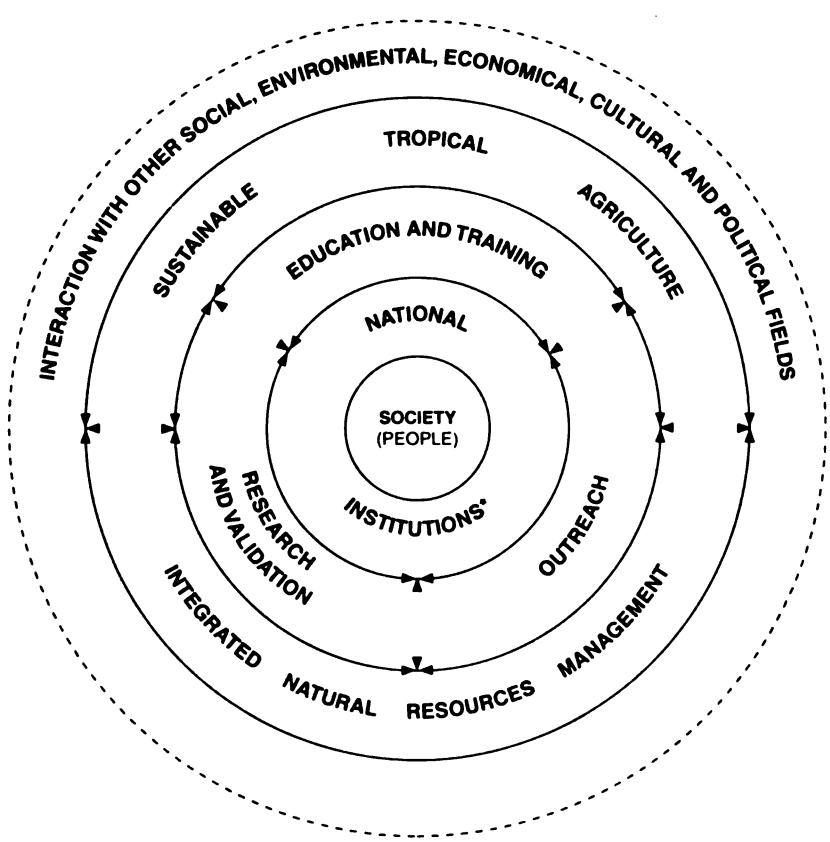
The final section of the Report illustrates in detail the institution's most important accomplishments in this biennium.

I. Introdnction

The Tropical Agriculture Research and Higher Education Center (CATIE), founded in 1973, is a scientific and educational non-profit regional center, with full legal standing, whose purpose is research in the agricultural sciences and on natural resources and related subjects, and post-graduate and training in these fields, for the tropical regions of the Americas, especially in Mesoamerica and the Caribbean. Member countries include Guatemala, El Salvador, Honduras, Nicaragua, Belize, Costa Rica, Panama, the Dominican Republic, Mexico Venezuela and Colombia. The Center conducts outreach activities throughout the region by means of information dissemination, development of human resources through training, and the demonstration of best practices, technologies, and management systems. Activities in the countries also include the execution and administration of development projects and technical assistance. CATIE's Headquarters is located in Costa Rica, but the Center has National Technical Offices in Guatemala, El Salvador, Honduras, Nicaragua and Costa Rica.

CATIE's Mission is: "To improve the well-being of humankind by applying scientific research and higher education to the development, conservation and sustainable use of natural resources in the American Tropics." The focus is society, and the mechanisms to serve the countries are education and training, reserach and validation, and Outreach (see Chart 1).

Chart 1: Diagram of CATIE mission and program organization



CATIE's areas of interest include forestry, agroforestry systems, watershed management, biodiversity and protected areas, sustainable agriculture, and environmental economics and sociology.

CATIE's Education Program began in Turrialba in 1946 as part of the programs conducted by the Interamerican Institute for Agricultural Science of the OAS. Consequently, its postgraduate educational experience spans more than 56 years and is the oldest in Latin America and the Caribbean.

Since its inception, CATIE has maintained a commitment to education and therefore has graduated more than 1400 Master's students who come mainly from the Americas, although there have been representatives from six continents over the years.

CATIE is governed by the Interamerican Board of Agriculture (IABA), the Council of Ministers, composed by Ministers of Agriculture of the Member Countries, and the Board of Directors, an independent Board which includes representatives from different stakeholders. Their guidelines are followed by the Director General, who is supported by specialized staff in finance and administration, and in strategic planning and external cooperation. The Director General heads an organizational matrix made up of the Research, Education and the Outreach Program. Scientific and academic staff are assigned to technical areas which are responsible for the execution and coordination of research, education and outreach activities.

In accordance with Clause Nine of the CATIE Charter, it is the duty of its Director General to submit a biennial report on the work accomplished to the Inter-American Board of Agriculture (IABA). The present report corresponds to the biennium 1997-1998.

The report analyzes the institutional situation and presents the activities and actions of the Council of Ministers and the Board of Directors, as higher bodies created by IABA in 1991, to streamline and strengthen the Center.

II. PROGRESS AND ACHIEVEMENTS: HIGH ADMINISTRATION

1. Restructuring process

The 1997-1998 biennium was a positive period of growth and consolidation for CATIE as a whole. In the opinion of the General Directorate, the reforms of CATIE's By-laws and administrative structures have fully attained their objectives and the Center is now managed flexibly and with an appropriate capacity of response.

The restructuring process that started in 1993 following the lines of the new Strategic Plan (1993-2002) and the Institutional Development Plan (1995-2002), has borne fruit, and the improvements attained in efficiency, sustainability and accountability enable CATIE to be positioned among the best international research centers in the world.

The adherence of two new countries, Venezuela en 1997 and Colombia in 1998, as Regular Members of CATIE, is an indicator of the relevance of the institutional products and services to the end of the millenium, and also an indicator of confidence in the Center's efficiency and accountability. It also represents a huge challenge and, at the same time, an opportunity to better serve tropical America, contributing to fulfill the institution's mission of improving the well-being of humankind through higher education and research in agriculture and natural resources management. Colombia and Venezuela are welcomed to CATIE's community. Efforts have already been initiated to identify opportunities and implement activities through alliances with research institutions and universities of high relevance and tradition.

During the biennium 1997-1998, the Strategic Plan has been fine-tuned, addressing crucial managerial issues of its three main programs, i.e. Education, Research and Outreach. The impacts of these reforms are already visible.

In the following, a list of the most important changes which were implemented during the biennium is provided:

- In 1997 the Institution consolidated a restructuring process using lines of action to define and organize activities within Programs. The Research Program, whose activities were structured according to Administrative Areas (Sustainable Tropical Agriculture Area; Watersheds and Agroforestry Systems Area; Management and Conservation of Forests and Biodiversity Area; Production and Conservation Economics and Sociology Area) is now structured according to research lines, some of which go across and integrate efforts of different Areas. They are: Research Line 1: Germplasm improvement and conservation of selected agricultural crops and forest species; Research Line 2: Agroforestry and forestry integrated pest management; Research Line 3: Tropical agroforestry systems for hillsides, frontier and degraded lands; Research Line 4: Development of technologies for the sustainable management of forests and their biodiversity; Research Line 5: Socio-economic analysis and valuation of policies, and the environmental goods and services of tropical ecosystems.

- All of CATIE's numerous research projects, including the students' thesis research, fit within those Research Lines, and have specific assigned personnel, and a clearly defined budget. Having

the Graduate School linked to the Research Program means that the student research can be better supervised by CATIE's research staff, and is completely in line with CATIE's research priorities. The number of papers published in internationally recognized scientific journals increased notably in this biennium. In fact, during 1997 and 1998, considerable improvement was made in the administration of the Research Program, and in particular, in the publishing of research results in scientific journals. There were more publications in 1997 than in any other year in the decade (see table 12 and chart 10). The complete list of CATIE's publications during this biennium can be found in Appendix 5.

- The activities of the Outreach Program, executed through the Technical Cooperation and Marketing Area, the Conference and Training Area, and the Communications and Information Area, were consolidated into four principal Outreach Lines during the biennium. These lines, approved by the Board of Directors, and ratified by the Council of Ministers early in 1998, are: Line 1: Promotion, Cooperation and Technical Assistance; Line 2: Participative Validation of Technology; Line 3: Continuous Education through Training and Conferences; and Line 4: Management and Dissemination of Information.

- The Graduate School has continued to improve its higher education programs. The four M.Sc. programs, namely Ecological Agriculture, Management and Conservation of Forests and Biodiversity, Environmental Economics and Agroforestry Systems, now have a revised pensum and have streamlined procedures for thesis preparation within the research lines. More than 400 professionals apply yearly to the four programs, and about 50 enter the Graduate School yearly. The Doctoral Program, created in 1996, now offers three options, namely: Tropical Foresty, Tropical Agroforestry Systems and Tropical Agriculture. Lack of scholarships constitute the most important limiting factor to augment the number of students that attend CATIE's Graduate School.

- The Doctoral Program, initiated in 1996, is a joint cooperative program with American and European universities. During the 1997-1998 period, the agreements for joint doctoral programs, initially signed with Colorado State University and the University of Florida, were extended to the University of Hohenhein, the University of Freiburg, the University of Helsinki, the University of Louisiana and Texas A&M.

- CATIE's Faculty was defined and created in 1998. It was decided that only individuals with Ph.D.s, who devote a high percentage of time to research, could be members of the Graduate School Faculty. This was a difficult decision to implement due to the number of conflicting interests within the institution. Nevertheless, having this standard guarantees excellence in the academic courses offered and the thesis research carried out at the Graduate School after 1999.

- During the 1997-1998 biennium the National Technical Offices (NTO) in member countries consolidated its links with the government and the private sectors. The NTOs increased the number and scope of activities, including the support to member countries through technical assistance, and efforts devoted to the negotiation and execution of research and development projects.

- Also the National Advisory Councils, which are composed of government officials, and representatives of civil society, NGOs, producer associations and universities, were established during the biennium as the most important forum to discuss national priorities for institutional action and to obtain overall feedback on CATIE's activities at field level.

2. Council of Ministers

During 1997 CATIE's Council of Ministers, which is formed by the Ministers of Agriculture of Member Countries, held one Ordinary and one Special Meeting. In 1998 the Ministers met once.

The Council analyzes the institutional situation referring to Programs, Strategic Planning and finances, and reviews policies to streamline the Center's organization to better serve the region. During 1997 the Council analyzed the accomplishment of the Research, Education and Outreach Programs and ratified CATIE's budget for that year which had already been approved by the Center's Board of Directors. They recommended that the Inter-American Board of Agriculture (IABA) reelect Brazil as its representative on the Council of Ministers, and appoint Dr. Whetten Reed, of the US Department of Agriculture, as the Board's representative on the Council of Ministers.

Probably the most important task that CATIE's Council of Ministers undertook during 1997 was approving modifications to the Center's Constitutional Contract sent by the Board of Directors, which were later sent to the IABA for ratification. The IABA in turn, sends these modifications to IICA, the body in charge of presenting them to the Costa Rican Ministry of Agriculture. The last step in this process is their referral to Costa Rica's Legislative Assembly where they would be passed into law.

The Council pledged its support of CATIE's initiative to seek funds from the IDB and the BCIE for scholarships for a Regional Masters Program in Environmental Economics and Sociology.

Venezuela and Colombia were welcomed as new member countries, in 1997 and 1998, respectively.

In 1998, the Council of Ministers ratified CATIE's 1998 annual budget, and approved the revised version of the Strategic Plan 1993-2002. This version includes the new Research and Outreach Lines which provide the framework for the institution's future activities in these areas.

3. Board of Directors

During 1997 and 1998, CATIE's Board of Directors and its Committees met four times to analyze different reports on the activities of the three main institutional programs and to discuss the proposed modification to the Institution's Strategic Plan. The revised version of this Plan was approved in 1998, and sent to the Council of Ministers for its ratification. Board members also heard presentations made by a group of Swedish (ISO) Consultants, who had analyzed CATIE's management and the progress made in the implementation of the Institutional Development Plan. The Legal Advisor made a presentation in 1997 concerning the current legal status of the institution.

Each year the Internal and External Auditors present the Board with their findings. In 1998, Board members resolved to modify the Center's travel regulations.

In 1997 the Board vested in the Chairman the responsibility of elaborating the Agenda for the Council of Ministers' meetings.

In 1998 members of CATIE's Board of Directors approved the purchase of an office in Guatemala City to house the Center's National Technical Office. This will be an important investment for CATIE.

Also in 1998, the Board approved the announcement for the Director General's position to be published in international journals and sent to Ministries, Embassies, etc. The Board will choose between three and five finalists, and the Council of Ministers will elect the new Director General during their ordinary Meeting in 1999.

In their meeting in November 1998, Board members gave their support to CATIE's efforts to aid Central American populations affected by Hurricane Mitch. This aid will include donations, technological assistance and project formulation support, to help Honduras, Nicaragua, Guatemala and El Salvador.

4. Finances and Administration

a. Finances

CATIE is a legal, international, non-profit institution. CATIE was founded in 1973 and in 1983 a new contract was signed for an additional twenty-year period.

CATIE's resources originate from regular income, agreements and productive activities. Its financial management information has been divided into five funds, according to their purpose and source (independent or consolidated financial statements): Basic Activities Fund, Trust Fund, Retirement Fund for Principal Professional Staff, Plant Fund and Agricultural Activities Fund. The accounting records and financial statements are expressed in US dollars (US$).

The majority of the income for the Basic Activities Fund is generated by the US $50,000.00 annual membership payments from member countries, and a regular contribution from the Inter American Board of Agriculture through IICA. In 1997 this contribution amounted to US$1,361,700.00 in 1998 it was US$1,293.600.00. Registration fees for regular students in the Masters and Doctoral Programs and for participants in training courses represent other important funding sources for the Basic Activities Fund.

This Fund was also augmented by the contributions made by the Honorable Governments of Sweden and Denmark, which in 1997 represented US$ 1,347,773.00, and US$ 500,000.00, respectively. The 1997 accounts also included US$ 434,000.00 that had been transferred to CATIE by the Government of Sweden in 1995. In 1998 the contributions of Sweden and Denmark were US$1,249,896.00 and US$520,474.00 respectively. The government of Norway also made a considerable contribution through NORAD of US$132,000.00.

The item "Trust Fund Income" includes the funds received to perform specific research, education and development projects. These funds are managed as "Custody Funds." A significant portion of these moneys is kept in "Quetzals" due to the large number of projects administered on behalf of the Guatemalan Government (Ministry of Agriculture and Livestock).

The income generated by the item "Productive Activities" comes from two main sources: Institutional Services, and Commercial Farms. The first encompasses housing and hotel services and represents the largest sum. Sugar cane, milk and coffee production are the most important agricultural activities on the commercial farms. In 1997, these activities earned US$ 437,863.00 for CATIE's Core Fund while in 1998 they generated US$660,346.00.

All institutional accounts are audited annually by an internationally renowned Auditing Firm selected by the Inter American Board of Agriculture at its biannual meeting. All special project funds are audited periodically by different external auditing firms hired by the donors.

The item "Depreciation" was shown as an expense in previous years, affecting the Overall Balance. Since 1997, this item has been recorded directly into the Core Fund as an exclusive item to register depreciation of machinery and equipment.

Tables 1 and 2 present a summary of the Center's financial status from 1997-1998.

Table 1: Asset liability and balance combined statement of funds for 1997 and 1998 ($US)

	1997	1998
ASSETS		
Current Assets		
Cash	4,437,542.00	5,472,431.00
Negotiable assets	2,056,499.00	2,034,685.00
Document and account receivable		
CATIE's members	1,640,091.00	1,689,692.00
Other entries	1,004,718.00	1,031,354.00
Total accounts receivable	2,644,809.00	2,721,046.00
Inventories	150,066.00	426,272.00
Expenses paid in advance	4,138.00	7,583.00
Total current assets	9,293,054.00	10,662,017.00
Building, machinery and equipment	3,411,660.00	3,457,754.00
Other assets	2,361.00	8,633.00
Member long term account receivable	616,243.00	647,415.00
TOTAL ASSETS	13,323,318.00	14,775,819.00
FUND LIABILITIES AND BALANCES		
Current liabilities		
Account payable	954,237.00	1,059,562.00
In Trust Funds	107,896.00	99,813.00
Documents payable	24,580.00	---
Accumulated Social benefits	90,186.00	290,065.00
Total liabilities	1,168,816.00	1,457,523.00
Deferred credits, other liability	1,317,646.00	744,950.00
Net assets		
Regular funds	3,806,216.00	3,618,502.00
Funds in Custody	2,246,198.00	3,240,614.00
Donations Agreements and Contracts	1,372,782.00	2,256,476.00
Working Fund	3,411,660.00	3,457,754.00
Total net Assets	10,836,856.00	12,573,346.00
TOTAL LIABILITIES AND WORK FUNDS	13,323,318.00	14,775,819.00

Table 2 shows that the 1997, total income was US$17,271,308.00 while expenditures reached a total of US$16,899,764.00, illustrating a surplus of US$371,544.00. In 1998 total income reached only US$16,183,532.00 but total expenses were just US$15,591,675.00, with a surplus of US$591,857.00.

Table 2: Income and Expense balance for 1997 and 1998. Core anf Project Budget. Amounts expressed in US$

	1997	1998
INCOME		
Membership	1,861,700.00	1,795,275.00
Technical Support Services	232,684.00	351,430.00
Teaching Activities	627,516.00	529,452.00
Productive Activities	2,016,323.00	1,856,366.00
Administrative and Logistical Support	713,443.00	1,003,536.00
Exchange Differences	(18,476.19)	(34,127.00)
Other Income	303,459.19	240,238.00
Donations and Specific Contributions	2,401,420.00	2,407,178.00
Subtotal	**8,138,069.00**	**8,149,348.00**
Income from Trust Funds	**9,133,239.00**	**8,034,184.00**
Total Income	**17,271,308.00**	**16,183,532.00**
EXPENDITURES		
Director's Office and Senior Management	916,783.00	659,876.00
Administration and Services	1,093,686.00	1,111,536.00
Technical Programs	4,177,596.00	4,590,059.00
Productive Activities	1,578,460.00	1,196,020.00
Subtotal	**7,766,525.00**	**7,557,491.00**
Expenses in Trust Funds	**9,133,239.00**	**8,034,184.00**
Total Expenses	**16,899,764.00**	**15,591,675.00**
Income - Expenditures Surplus	**371,544.00**	**591,857.00**

The Center's financial situation remained stable in 1998, and the approved budget items were satisfactorily executed. The surplus from 1998 was sufficient to begin financing activities for the first trimester of 1999.

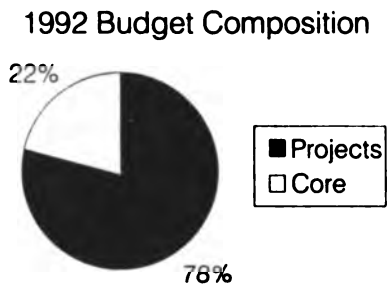
Budget Allocation to CATIE's Main Programs

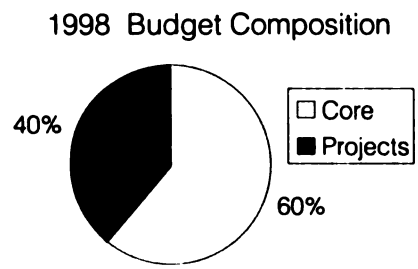
To carry out its objectives, CATIE is organized into three main programs: Research, Education and Outreach. They form an interconnected triangle with synergistic effects. Technology generation and validation; higher education; and outreach through training, technical assistance, and information dissemination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

The main sources of institutional funding are membership fees, special donations and contributions to core budget, project support, income from tuition and fees from educational activities, and income from institutional services and productive activities. In the past seven years, CATIE has made important inroads to improving budget composition by increasing core contributions versus the other components.

The following figures compare the situation in 1992 with the present budget composition.

Charts 2 and 3: Comparison of the Budget Composition between 1992 and 1998





The presence of a higher percentage of Core funds allows CATIE to have more flexibility to allocate resources to priority lines of action, simplifying institutional planning. Project support continues to be a valuable asset, not only because it provides an indispensable contribution to cover overhead costs, but mainly because of the research and development activities which it funds. Project support continues to be the main source of funding for CATIE's activities in Member Countries.

b. Administration

During 1997 and 1998, some important activities were carried out in the Administration Area to improve services offered by CATIE to support research and teaching activities. Thanks to these efforts, CATIE now has meeting rooms and well-appointed guest housing with an 80-person capacity. The hotel facilities are in excellent condition after the remodeling and improvements made. A marketing program has been initiated to increase visitor occupancy.

The following buildings and areas were remodeled, repaired or refurbished during the 1997-1998 period: Irazu Apartments, Casa del Cafe, the meeting room on the third flour of the Henry Wallace Building, Inter-American Primary School, the Graduate School, and the Training Building and remodeling efforts have begun on the Orton Memorial Library.

During this period, improvements on the procedures and information continued and inventory and purchase systems were implemented. With those tools, administrative procedures were simplified and response time reduced. An efficient inventory database will mean greater ease in report writing and there-by better decision-making.

A landscape program for CATIE's campus was designed by a specialist during 1997 and the first steps of the program were accomplished. The Casa del Cafe Building grounds, as well as those around the Orton Memorial Library parking lot, the Graduate School and the Training Center were re-landscaped.

Since April 1997, a new concessionaire has been operating the Institutional Cafeteria, which is a very important service to our students and visitors, as well as for our personnel. The quality of the food and service was significantly improved.

Twenty percent of the vehicles purchased by the core budget were replaced to maintain quality of services as well as the total investment value. A new whirl chart was purchased, as well as new mowing machines for grounds maintenance. These acquisitions meant a significant reduction in personnel.

A personnel rotation was implemented in the Purchasing Unit to broaden the employees' experience and versatility. Many of these employees had been performing the same duties for many years.

Progress was made in the decentralization process by simplifying purchase and work orders. This in turn, improves efficiency in the supply office and physical plant. The administrative assistants of various units and projects have been coordinated in order to promote faster processing of paperwork.

A new schedule was established for the messengers that deliver internal communications in the CATIE offices and buildings. Shift time was reduced and the elimination of fixed positions in individual offices increased coverage.

One important point that stands out is the agreement signed by representatives from the Permanent Workers Committee (CPT) which represents CATIE's Costa Rican employees. According to the agreement, employees were paid all their severance pay for time accrued up until December 31, 1998. The agreement, approved by the Costa Rican Ministry of Labor, solved two important problems:

a) All severance pay accrued, up to a maximum of eight years, was paid out to project employees based on his or her most recent salary. The difference was financed by CATIE with no possibility of suing the projects for back salary.

b) Turns an expected right into an actual right for the worker by breaking the eight year cap on severance pay.

In addition to establishing an accrued severance pay up to December 31, 1998, 1/12 part of the salary of each employee will be deposited monthly starting in 1999. This portion corresponds to the worker severance pay and forms part of the employer expenses. It can be reported as a legitimate cost in the project budgets.

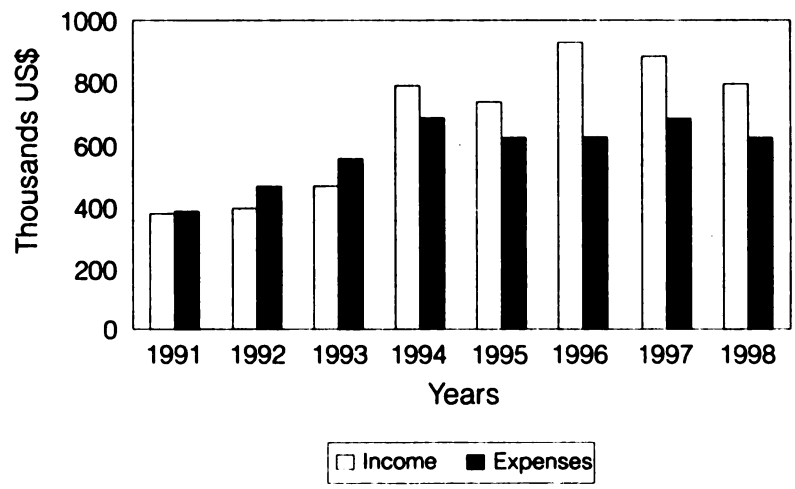
This portion of their severance pay is deposited in individualized trust funds which the worker will have the right to access on separation from the institution, regardless of the motive for his or her leaving.

Through this agreement, the employees agreed to a change in the regulations regarding vacations which were changed to up to 30 working days depending on the seniority of the employee. With the new rules, the institution will only recognize two weeks vacation after the employee has worked 52 consecutive weeks. This represents a significant savings in time and contracting for temporary workers in those cases where the employee has the right to 30 working days (six work weeks) vacation.

As seen in Charts 4 and 5 below, one of the most important productive activities at CATIE is housing services. Compared to 1995, 1997 showed a 5% increase in total revenues and the bulk of this is reflected in housing rentals and hotel activities. The increase is notable, coming at a time when the ending of some projects has prompted a decrease in activities. A marketing program for the European Community Hotel was initiated with some travel agencies that resulted in a significant increase in occupancy. In 1998 alone, the net income from housing services totaled US$350,000. Farm production is also contributing to the Center's financial sustainability. During 1998 it brought in a net income of US$172,000 (although it should be noted that this figure is somewhat low, since 1998 was an especially bad year for sugar cane due to severe drops in international sugar prices and some production problems). The third most important income-producing activity is transportation services, which generates a total of approximately US$44,000.

Chart 4: CATIE Net Income & Expenses from Housing and Rent in Thousands US $

Chart 5: CATIE Net Income & Expenses from Farms in Thousands US $



5. Strategic Planning and External Cooperation

The Strategic Planning and External Cooperation Office was created in 1994. It is responsible for all external cooperation on a day-to-day basis, including donor relations, formulation and negotiation of project proposals, fund raising, government relations, consultancies, and corporate image among our peers, and within the international community.

The objective of the Office is also to lead and supervise the continuous planning, monitoring and evaluation processes of the institution.

During 1997-1998, the external cooperation activities focussed on maintaining governmental agency and donor agency relations: to negotiate donations and Core Budget contributions; to conduct and negotiate projects; to negotiate institutional agreements; to prepare proposals to participate in bidding processes and negotiate consulting contracts. Strategic planning activities included drafting biannual work plans

for 1998-1999 and the drawing up of individual 1998 work plans for all CATIE personnel. The Institutional Strategic Plan was reviewed and the revised version was approved by the Board of Directors and Council of Ministers.

Monitoring activities on the implementation of work plans were also carried out periodically, and a biannual report on the progress made in implementing the Institutional Development Plan was drafted and submitted to the Swedish International Development Agency (SIDA).

As a result of these activities, many financial institutions and countries made significant contributions to financing research, teaching and outreach activities during 1997. These contributions reached a total of US$9,254,469.00 and are presented in detail in Table 3. The main donor countries were: Denmark, Sweden, Norway, Holland, Switzerland, Germany, France and the United States. During 1998 they totaled US$8.5 million dollars.

During 1997, 41 new projects were successfully negotiated for a total amount of US$8,751,965.00. In 1998 this number was: 46 for a total of US$20,500,000.00. New projects are necessary if CATIE is to continue functioning at its current level of excellence. The signing of these projects and the significant amount of funding they imply, is clear evidence of the confidence donors such as COSUDE, SIDA, DANIDA, NORAD, NRI, ACRI, USDA, CIAT y CIFOR, continue to have in CATIE. We extend them our deep thanks for their interest in development in the region.

Table 3: Institutional/Country cash Contributions to CATIE Programs

Contributions to CATIE's Research, Education and Outreach activities by country/institution	1997 Contributions Amount US$	1998 Contributions Amount US$
Canada (IDRC, CIDA)	33,701.00	24,275.00
Denmark (DANIDA)	2,466,178.00	1,686,726.00
Finland (FINNIDA)	135,712.00	---
France (MAE, ORSTOM and CIRAD)	65,000.00	4,700.00
Germany (GTZ, BMZ)	223,323.00	296,577.00
Guatemala (UNEPROCH/MAGA)	542,123.00	758,669.00
The Netherlands (Ministry of Foreign Affairs)	442,225.00	379,010.00
Norway (NORAD)	699,684.00	544,333.00
FUNDATROPICOS	795,111.00	98,600.00
Sweden (SIDA)	1,448,013.00	1,249,895.00
Switzerland (COSUDE)	900,230.00	1,170,678.00
United Kingdom (ODA, NRI)	324,253.00	317,039.00
United States of America (AID)	519,862.00	907,115.00
Other Institutions (WWF, IPGRI, BID-CIAT, CIFOR, ACRI, European Community)	659,054.00	1,360,874.00
TOTAL	9,254,469.00	$8,798,491.00

The Center has participated in several bidding processes in the Member Countries. For example, in conjunction with IICA-CRS-UCA, CATIE won the rights to International Development Bank funds for the management of the Lempa River high watershed area. This corresponds to the El Salvador Environment Program. In Nicaragua, the Center is carrying out a strategy to increase the supply of firewood and improve energy efficiency in the Pacific region through the PROLENA Program. In Guatemala, CATIE participated in the grant proposals of the Peten Sustainable Development Program (funded by IDB) and PROSELVA (funded by KfW in Germany and the Government of Guatemala). Both were successful. These actions make it possible for the institution to have a greater presence in the region and to offer technical assistance as well as to transfer technology.

Another important achievement: in 1997, 25 new cooperative agreements were signed with different institutions and member countries in order to reach a great variety of goals and needs. In 1998 this figure was 23. The success of these efforts indicative the growing interest in CATIE and the good image the Center has in the region. Some of the most important agreements were those with reference to doctoral studies, such as those signed with Texas A&M University, Freiburg University, Hohenhein University and Helsinki University. See Annex 6, Table 3.

III. PROGRESS AND ACHIEVEMENTS: GENERATION AND TRANSFER OF KNOWLEDGE

In 1997 the institution made a revision of its Strategic Plan and the restructuring process was consolidated. The Research Program, whose activities were structured within the Technical Areas (Sustainable Tropical Agriculture Area; Watersheds and Agroforestry Systems Area; Management and Conservation of Forests and Biodiversity Area; Production and Conservation Economics and Sociology Area) is now structured according to research lines, some of which go across Areas: Research Line 1: Germplasm improvement and conservation of selected agricultural crops and forest species; Research Line 2: Agroforestry and forestry integrated pest management; Research Line 3: Tropical agroforestry systems for hillsides, frontier and degraded lands; Research Line 4: Development of technologies for the sustainable management of forests and their biodiversity; Research Line 5: Socio-economic analysis and valuation of policies, and the environmental goods and services of tropical ecosystems.

This restructuring, which started in 1996, was made in an effort to more efficiently manage limited resources and coordinate personnel efforts, since many projects do not fit solely within one Area but often overlap in two or more different Areas.

The Outreach Program was also restructured to Lines. Almost all the activities of the Technical Cooperation Area fall under Line 1: Promotion, Cooperation and Technical Assistance. Line 2: Participatory Validation, Demonstration and transference of Management Practices, encompasses the validation and development Project activities which CATIE executes in the Member Countries (such as Olafo, TRANSFORMA etc.). The Training Area activities fit nicely within Line 3: Continuous Education through Training and Conferences. Finally, Line 4: Information Management and Dissemination integrates all the Communication and Information Services Program activities.

An effort was also made to better coordinate CATIE's research and higher education programs. As a result, the document outlining CATIE's Research Lines is currently being used as the basis for the approval of the students' thesis topics. This creates an operating mechanism that guarantees that the thesis topics adhere to the Institution's research lines and address strategic regional research issues.
This procedure was indispensable, since the bulk of the research carried out by the Institution is done through the students' thesis research. Although this basic truth is often glossed over or ignored, it is important that CATIE's researchers begin to stand up and take notice of the importance of the graduate students, not only for the institution, but for themselves.

The restructuring process also included the definition and creation of CATIE's Faculty. It was decided that only individuals with Ph.D.s, who devote a high percentage of time to research, could be members of the Graduate School Faculty. This was a difficult decision to implement due to the number of conflicting interests within the institution. Nevertheless, having this standard guarantees excellence in the academic courses offered and the thesis research carried out at the Graduate School after 1999.

The decision was not uniformly supported by all CATIE personnel since this limits the activities of those individuals who have only a M.Sc. or its equivalent. Nevertheless it is interesting to note that many who have never considered seeking a higher degree now view it as a viable option.

Professionals from all three Programs participated in a number of international congresses and Workshops, and the number of papers published in internationally recognized refereed journals increased markedly. For more details see Section III.2., Research Programs, and Appendices 3 and 5.

1. Education for Development and Conservation Program

The Education for Development and Conservation Program (EDECO) through its Graduate School has the objective of providing an integrated educational foundation for graduate students, which seeks to strengthen the students' morals and ethics and raise their social awareness. It aims to give them the economic and managerial tools necessary for decision-making, and the biophysical tools necessary for learning more about the environment and nature (the use of which helps them make those decisions). It also provides the basis for sustainability, which is reflected in the philosophy, "produce while conserving and conserve while producing". The objective is to seek a balance between production and productivity, while still protecting the environment, human health and the ecological continuum. Considered equally important, within the educational process, is training in both computer skills and the English language as they are indispensable keys to the business world in the 21st century.

The Graduate School has two basic programs: the 2-year Masters Program and the 3-year Doctoral Program. The latter was begun in 1996 and has required great effort to consolidate and put on track.

a. The Master's Program

The Graduate Study Program began at CATIE in 1946, with the first Master's degree awarded on July 8, 1947, to a Mexican professional. The Graduate School, with its 51 years of continuous operation, is the oldest one in Latin America in the fields of agriculture and natural resources management and is recognized among the finest higher education institutions worldwide.

During its existence, the Graduate School has undergone several transformations to improve its operation and to achieve its aims. In this context, as of April 1, 1997 the Education for Development and Conservation Program (EDECO) was formally changed, as a result of the decision to transfer the Training Area to the Outreach Program, and in turn, stronger links were enforced between thesis research and institutional research projects. The objective was to guarantee the full coordination of the thesis research, leading to M.Sc. or Ph.D. degree, within the research priorities of the institution as laid down in 1996. This permitted the students to achieve greater mastery of the research

processes and will also help the Institution strengthen the research processes through student degree theses more closely integrated within the priorities established in the research agenda.

Chart 6 shows the number of students who applied to the CATIE masters program compared to the number admitted and those who registered each year since 1987.

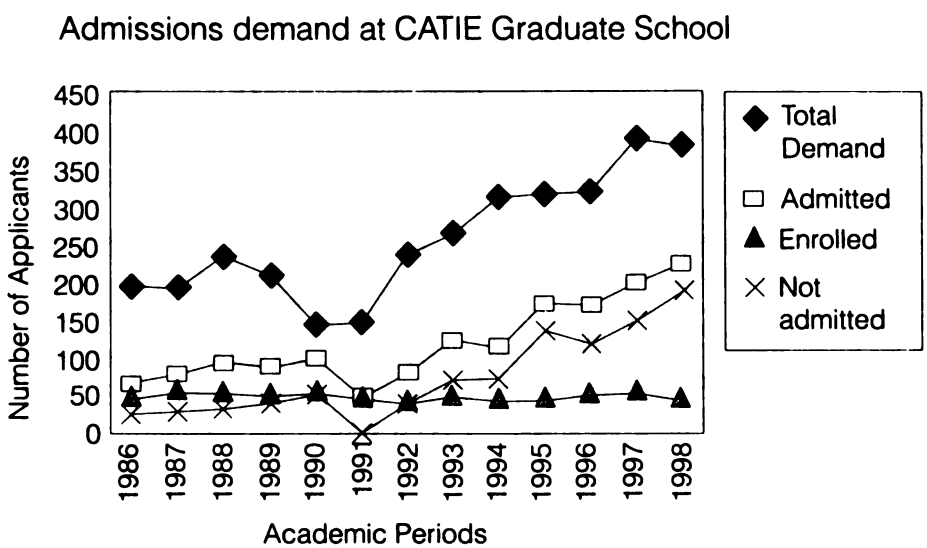


Chart 6: Admissions demand at the CATIE Graduate School from 1986-1998

As can be seen in the figure, the number of students applying to the Graduate School has increased significantly in the last decade reaching approximately 400 applicants per year. On analysis, it is shown that the most significant limiting factor to applicant acceptance is scholarship availability. In spite of the fact that the institution has given constant attention to this point, it has not been possible to offer a satisfactory solution. In effect only through a growing investment of core funds at CATIE, balancing the reduction of scholarship funds granted from other diverse sources, have the average number of students been able to be maintained. In the last two years (from 1997 to 1998), a total of 97 students have enrolled in the program, the vast majority of which had at least partial funding from CATIE. A number of donor agencies such as DANIDA, DAAD, the Dutch Government, COSUDE, NORAD, the Government of England, GTZ/BMZ, etc., have supported the effort but without being able to fulfill the demand in order to reach institutional capacity.

Table 4. Funding Sources for Graduate School Scholarships 1990-1998

SOURCE	1990	1991	1993	1994	1995	1996	1997	1998	TOTAL
ARGENTINA	-	1	-	-	-	-	2	-	3
BID	-	-	-	-	-	1	1	-	2
BOLIVIA	3	2	1	1	-	11	3	1	22
BRASIL	-	4	1	3	2	2	2	1	15
CANADA	1	-	1	-	-	-	-	-	2
CATIE	2	-	-	2	2	2.5	15	4	27.5
COLOMBIA	1	-	-	-	-	-	1.5	-	2.5
COSTA RICA	-	-	-	-	2	-	-	-	2
CUBA	-	-	-	-	1	-	-		1
DENMARK	-	-	-	-	1	3	3.5	3	10.5
ECUADOR	-	-	-	-	-	-	1	-	1
FAO	1	-	-	2	-	-	-	-	3
FINLAND	-	-	-	-	1	-	-	-	1
GERMANY	1	6	6	5	5	5	3	3	34
GUATEMALA	-	-	-	-	2	1	-	-	3
IICA	-	-	-	-	2	.5	.5	-	3
MEXICO	1	4	2	1	1	-	2	-	11
NICARAGUA	1	-	1	-	-	-	-	-	2
NORWAY	11	1	-	-	-	-	2	-	14
OEA	1	2	2	-	-	-	-	1	6
SELF FINANCING	2	1	1	-	4	2.5	9	13.5	33
SPAIN	-	-	-	2	4	-	.5	-	6.5
SWEDEN	4	3	2	2	2	-	-	1.5	14.5
SWITZERLAND	-	-	-	-	1	1	1.5	3.5	7
THE NETHERLANDS	16	6	12	9	9	6.5	9.5	6.5	74.5
U.K.	3	5	1	5	3	3	.5	2.5	23
USA	5	-	12	19	1	2	2	-	49
VENEZUELA	-	-	-	1	-	1	1	2	5
WORLD BANK	-	-	-	-	-	1	-	-	1
WWF	-	-	-	-	-	.5	.5	-	1
TOTAL	52	44	42	50	43	44	61	43	379

The geographic coverage of the Program students has remained relatively constant in the last few years, with more students coming from CATIE member countries, but with an important participation from students from the rest of the hemisphere and a few from Europe. Nevertheless the participation of Caribbean students has continued to be low (see Tables 5 and 6), possibly because of the language barrier. This is one more reason the Center has placed such a focus on the goal of bilingualism in the last few years. Therefore, in 1997, the Program introduced the English requisite which requires each student to attend English classes in order to take and pass a final English evaluation administered by an independent body (until now, the British Institute). A further reason is to ensure that the predominantly Spanish speaking students can take full advantage of current materials and research in their fields, the bulk of which is published in English. This in turn benefits their countries of origin, as they will return better prepared to deal with up-to-date information and technology and be able to participate in conferences throughout the world where English is becoming the preferred intermediate language.

Tables 5 and 6 show a breakdown of students' countries of origin for the classes entering in 1997 and 1998.

As seen in these tables below, the academic programs offered to the CATIE Masters students entering in 1997 and 1998 focussed on the following areas: Ecological Agriculture, Agroforestry Systems, Environmental Economics; and Forest and Biodiversity Management. Within each of these areas the students had the choice of centering on one of several sublines through their thesis research project.

On average, a total of 55 courses were offered in which the students had to achieve a minimum grade of 80% in order to pass. The overall grade point average the last two years has been 87.6% which shows a strong academic performance. The quality of the courses is also evaluated, and the students' opinion used as the most important parameter. Based on these evaluations, the Graduate School and each professor are given goals for improvement. Using the same scale the students have assigned an overall evaluation of 86.4% to their courses in the last two years.

The average age of the CATIE graduate student was 29.9 and 30.9 for men and 29.2 and 30.8 for women in 1997 and 1998 respectively. This age ensures that the students coming into CATIE are already accomplished professionals in their chosen fields when they arrive, (Table 7).

Table 5: Candidates entering the Masters Program, by Country, Study Area and Sex. Students entering in January, 1997.

COUNTRY	Ecological Agriculture		Agroforestry Systems		Forests and Biodiversity		Environmental Economics		TOTAL
	M	F	M	F	M	F	M	F	
Argentina					2				2
Belize	1	1							2
Bolivia			1				1	1	3
Brazil			2						2
Colombia	1	1	1	1		1		1	6
Costa Rica	1	1			1		2		5
Ecuador					1	1			2
El Salvador	1	3					2		6
Guatemala			1				1	1	3
Honduras		1	1		1	1	1	1	6
Mexico			3	1	2	1			7
Nicaragua		1	2	1		1		1	6
Panama	1								1
Dominican Rep.	1								1
Uruguay			1						1
Venezuela	1						1		2
TOTAL									**55**

Table 6. Students enrolled in the Masters Program, by Country, Study Area and Sex. Students entering in January, 1998.

COUNTRY	Ecological Agriculture		Agroforestry Systems		Forests and Biodiversity		Environmental Economics		TOTAL
	M	F	M	F	M	F	M	F	
Argentina						2			2
Bolivia					2				2
Brazil				2	1				3
Colombia		1	2		1				4
Costa Rica	2		1				1	1	5
Ecuador								1	1
El Salvador		1		1		1	2		5
Guatemala	1				1	1			3
Honduras					1		2	1	4
Mexico					1				1
Mozambique						1			1
Nicaragua	2			1			2	1	6
Paraguay								1	1
Dominican Rep.		1							1
Venezuela	1	1				1			3
TOTAL									42

Table 7: Average age of graduate students on arrival at CATIE.

YEAR	MALES	FEMALES	AVERAGE
1990	30.1 (31)	28.2 (11)	29.7 (42)
1991	32.2 (36)	32.2 (7)	32.4 (43)
1993	32.0 (31)	33.0 (7)	32.1 (38)
1994	32.4 (38)	29.8 (11)	31.8 (49)
1995	31.2 (36)	29.3 (7)	30.9 (43)
1996	32.1 (36)	31.0 (16)	31.8 (52)
1997	30.9 (35)	30.8 (20)	30.9 (55)
1998	29.9 (21)	29.2 (20)	29.6 (41)

An important achievement in recent years has been the appointment of all the graduate students as research assistants. Through this mechanism, the students help carry out the plans of the Institution's Research Lines which are considered to have resonance in the region.

The following points out the outstanding achievements accomplished by the M.Sc. Program during the 1997-1998 periods:

- Redesign of the existing M.Sc. Programs pensums, and their consolidation into four major areas, improvement of efficiency and their adjustment to the new existing research lines.
- Defining the Faculty in the Graduate School, in order to ensure future quality and continuity of activities.
- Graduation of the first group of students in the area of Environmental Economics and Sociology.

- The design and implementation of an Intensive English Program for students entering the M.Sc. Program, in order to improve the proficiency of the English language among the students of the School. The evaluation exams were designed and administered by the British Institute of Costa Rica in order to ensure transparency and course integrity.

Consolidation of the Pensum Programs

The four M.Sc. Programs that are currently in operation were designed at the end of 1996, And consolidated during 1997. They are as follows:

- Ecological Agriculture
- Management and Conservation of Forests and Biodiversity
- Environmental Economics
- Agroforestry Systems

The Academic Coordinators Committee agreed that the 4 pensa should be consolidated, operating without modifications during the 1997 and 1998 academic years in order to evaluate the content, material and professors by the end of 1998.

It was further agreed that in November of 1998, the Master's Program Coordinating Committee and the Area Heads would evaluate the consolidated pensum with the goal of determining what adjustments needed to be made so that in 1999 the refined pensum could come into effect. To date, only the Agroforestry Area has suggested minor adjustments to its area pensum.
Major achievements in the admissions process.

- The reorganization of the Unit and the appointment of a full time M.Sc. staff member to supervise operations.
- The revision and redesign of the SIEP (Graduate School Information System Program) to automate the admissions process.
- The traditional catalogue was redesigned in order to make it more user-friendly.
- The Graduate School Web-site was designed.
- Four admissions exam sittings were scheduled and implemented for the first time in Graduate School history. This has become annual.

Major achievements in the registration process.

- Developed a SIEP version for registration and for the maintenance and storage of graduate records.
- Effective coordination of the course scheduling in each of the scientific areas, as a result of the partial rationalization of the pensum within the general reordering of the courses, initiated in 1997.
- Redesigned the Course Registration Form.

Major achievements in Student Activities

- Operation of a Mini Computing Center for Students' use, equipped with 5 upgraded computers and a laser printer for printing their final thesis draft.
- An increase in the number of social and cultural activities to improve students' quality of life.

- Celebration of CATIE's First Olympic Games. Students and personnel from CATIE, as well as other Costa Rican private and public universities participated.
- Improvement of the students' living quarters (painting, new curtains, total repair furniture, etc.) in close cooperation with the Administrative Units.
- Promotion and partial financial support for the graduate students' participation in various training courses and seminars, in order to complement their education.
- Increased counseling in personal and non-academic related activities.
- An increase in coverage and the up-dating of insurance policies that cover medical and hospitalization services.
- The creation of an alumni database. This is already being used for a number of follow-up activities.

Major achievements in the Administrative Area.

- Improvement made to the physical infrastructure of the School in order to guarantee its physical integrity.
- Modernization of the Admission and Registration Area's physical plant.
- Improvement of teaching conditions through the improvement of computer facilities and multimedia equipment, thereby enhancing the teaching capacities in each classroom.
- Set aside and redesigned an area for staff meetings and conferences (Sala Venezuela).
- Upgraded the personnel computing facilities; and re-used the replaced, upgraded equipment as part of the new mini-computing center for first year students.
- Administrative and secretarial support to other units of CATIE.
- Efficient and effective administration of the financial components of REDCA, Holland, DANIDA, ODA, DAAD projects.

After two and a half years of changes and adjustments to the procedures that meant important modifications in the organizational structure, technical procedures, pensum and the consolidation of the different Masters, 1998 was the year that the Graduate School was consolidated technically and administratively.

Consolidation of Statistical Support

Instruction in the field of Statistics has been strengthened at the Graduate School with the incorporation of new personnel which have given the statistics area a strong push. This has positive repercussions in the design and preparation of theses proposals and better experiments and statistical analysis in the students' thesis research.

In addition, the process has begun to identify and select a statistics package for data analysis that would ease the data analysis process. Currently, the best-known statistical data analysis packages are being discussed. They are: Minitab, designed at Pennsylvania State University; and STATVIEW from SAS.

The idea is that a student license be purchased in order to make it available to the students. In this way they could take the program back to their countries legally benefiting their future professional activities.

Endowment Fund

One of the main problems faced by the Graduate School has been the lack of an endowment fund from which the School could finance scholarships to potential students.

The tradition has been that scholarship be financed almost in their entirety with funds from projects or donor agencies, most notably in the past, by AID, and currently, by some important European donor agencies. When AID pulled out of the region at the beginning of the 90's, it left behind a great financing vacuum to be filled. This problem could be made more acute should any other large funding agency decide to turn their interest elsewhere. Recently, CATIE has channeled resources for scholarships through funds managed by CATIE's own FUNDATROPICOS foundation. Nevertheless, the funds available are not sufficient, in the long run, to meet the demand at the Graduate School.

Therefore the School with the support of the Office of Strategic Planning and External Relations has prepared a proposal to create an endowment fund for scholarships which could be attractive to many donors that are thinking seriously about "phasing out" the aid they currently offer CATIE.

Reorganization of the Academic Committee of the Masters Program Coordinators

In order to guarantee the technical operation and coordination of all academic activities, the Academic Committee of the Masters Program Coordinators was reorganized.

The committee meets once a month and the secretary rotates every three months among the coordinators of each of the four masters areas. Committee sessions are open to the active participation of the Student Council permitting a good level of collaboration between the students and the Graduate School authorities. The Student Council made many valuable contributions to the review of the Graduate School Standards and Procedures document.

Improvements to the Graduate School infrastructure and maintenance

Three main changes were:

a) Improve outside landscaping and create landscaped areas within the Graduate School complex;
b) Place country nameplates on the classrooms and decorate the interiors with the theme of the country. There are classrooms for: Honduras, Costa Rica, Guatemala, Mexico and Venezuela. The Secretary of Agriculture and Livestock from Honduras donated a replica of a Mayan petroglyph like those found in Copan to the Honduras Room.
c) Install air conditioning units in the four main classrooms and ceiling fans in the others to reduce the heat generated from January to May.

b. The Doctoral Program

The Doctoral Studies Program began in 1996, without specific allocation of funds for scholarships, based on agreements with the University of Florida and Colorado State University.

The three-year doctoral program now includes a year spent in Germany or in the United States mainly for coursework. Another two or more years are spent conducting scientific research in a tropical country under the guidance of CATIE's Graduate School. The graduates also have access to up-to-date information in their specialty and the tools at their fingertips to conduct world class scientific research.

Initially, the program had organizational problems that have since been overcome. Then, in 1997, the Program underwent a major reorganization, which was deemed necessary by the Program Head. Major achievements of the Doctoral Program have been:

- The reorganization of the Doctoral Committee.
- The reorganization and automation of the admission process. This consisted in the consolidation of the doctoral admissions' process within the Graduate School's office of Admission and Registration, as a normal and routine activity.
- The development of a specific set of criteria both for admissions and for the doctoral candidate selection process.
- The planning and execution of the Ph.D. Program marketing within CATIE's member countries, in the other countries of the hemisphere and elsewhere.
- Three students began their Ph.D. Work: two at Gottingen and one at Colorado State University.
- Improved relations with donors for scholarships (DAAD, GTZ, DANIDA and SWISS).
- Signed agreements with the Universities of Hohenheim, Texas A&M, Freiburgh and Helsinki, and negotiations with Louisiana State University. CATIE also enjoys an excellent working relationship with Gottingen University, although no formal agreement exists. This relationship has enabled two current students to go there.

New agreements with American and European Universities

One of the basic problems faced by the doctoral program since its inception was that the agreements with the University of Florida and with Colorado State University were questioned because of the financial points they contained. The agreements were such that CATIE students were required to pay the stated institutions "out-of-state" fees, which are considerable, plus an additional administration cost.

After conducting an internal analysis an organized search was started to select other universities within the United States and Europe with which associations could be made. In 1998 agreements were signed with Texas A&M University and Louisiana State University under better financial conditions than those with Colorado State and the University of Florida.

Both agreements state that the students pay their tuition and fees at CATIE and attend classes at Texas and vice versa. These agreements open the way to other future joint activities between the two institutions.

Formal ties were made with the University of Gottingen in Germany where there had existed unofficial links for two years.

The relationship with these European and American universities consolidates the Doctoral Program academically and sets the foundation for stronger ties with the aforementioned institutions.

The agreements in Germany were made possible through the German Academic Service, DAAD, which has been an important support of the Sandwich Program. DAAD provides funding for the doctoral students while they attend classes at a German university for the first year and then when they come to CATIE to do their research activities during the two following years.

Standards and Procedures

Clear standards and procedures have been established based on the Masters Program Standards and Procedures. Currently the document is being revised by the Doctoral Studies Committee. The preliminary standards and procedures are being applied to the five students currently enrolled in the program. The final revision should go into effect in 1999.

The Standards and Requirements for admissions was approved and is being applied to incoming applicants.

Doctoral Studies Committee

Another important part of the Doctoral Studies process was the selection of the aforementioned Doctoral Studies Committee which is presided over by the Director of Education and the Dean of the Graduate School. The committee directs the technical aspects of the program and establishes operative criteria, approves or rejects program candidates and advises the Director of Education on topics related to doctoral studies. The committee meets regularly every two months but special sessions can be called.

Doctoral Exchange Students

Another activity that has been strengthened is the doctoral exchange program with the European and American higher education institutions. A total of 13 students have come to do their field research at CATIE. These special arrangements have been made for students from the United States, Germany, Holland, France, Denmark, Sweden, and Finland among others.

Table 8 shows a breakdown of the exchange students from developed countries doing thesis research at CATIE from 1991-1998. It is clear that the Netherlands has sent the vast majority of exchange students, probably due to the close relationship between CATIE and the Dutch government. When the University of Wageningen project in Costa Rica comes to a close in 1998, the number of Dutch doctoral exchange students is foreseen to diminish in the future.

Table 8: Exchange Students from Developed Countries doing Thesis Research at CATIE in the Period from 1991-1998

COUNTRY	No. OF STUDENTS
Canada	16
Denmark	3
Finland	2
France	2
Germany	6
Spain	1
Sweden	1
Switzerland	3
The Netherlands	102
United Kingdom	3
United States of America	9
TOTAL	148

Doctoral Student Financing

The main limiting factor to accepting more students into the Ph.D. program revolves around lack of resources. The Doctoral Program has not enjoyed the specific financial support that the Masters Program has.

This topic is extremely important as traditional funding sources become less interested in financing long-term educational activities such as Doctoral Studies. CATIE must seek innovative solutions both internally and externally to solve this financing problem.

One solution might be to increase the participation of Doctoral students as research assistants replacing some of the research assistants currently employed by the institution on a permanent basis or as project employees. A second solution might be the creation of an Endowment Fund for scholarships as mentioned before.

Table 9. Applicants to the Doctoral Program in the 1996-1998 period (from the program's inception)

Applicants			Admitted			Enrolled		
Men	Women	TOTAL	Men	Women	TOTAL	Men	Women	TOTAL
78	18	96	24	7	31	3	2	5

2. Research Program

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

The Program's objective is:

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

Specifically, CATIE's Research Program aims at producing:

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

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

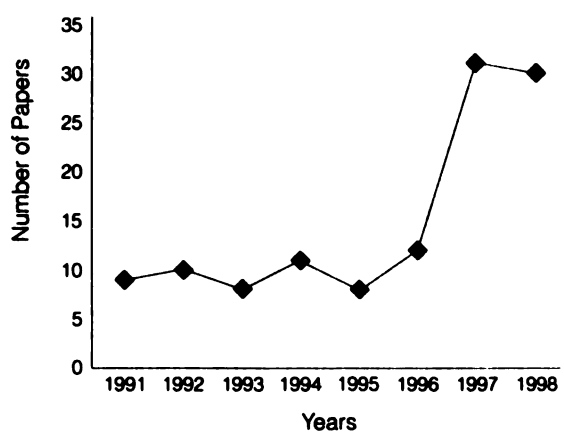
a. **Research Line 1:** Germplasm improvement and conservation of selected agricultural crops and forest species
b. **Research Line 2:** Agroforestry and forestry integrated pest management
c. **Research Line 3:** Tropical agroforestry systems for hillsides, frontier and degraded lands
d. **Research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

Table 10: CATIE, 1997-1998 Publications and Presentations by Research Lines

	Research Line					
Type of Publication	1	2	3	4	5	Total
Scientific journal	20	6	12	20	4	62
Technical journal	11	24	50	11	7	103
Other scientific						
Books	0	2	0	0	0	2
Chapters in Books	4	0	38	4	1	47
Papers in proceedings	26	45	32	63	14	180
Abstracts etc	10	24	3	7	1	45
Technical						
Technical Series (CATIE)	1	3	7	14	1	26
General						
Popular articles/bulletins	29	3	1	17	1	51
Progress reports	8	3	0	3	0	14
Academic						
Course materials	0	0	3	0	0	3
Thesis M.Sc.	11	15	25	18	33	102
Total	120	125	171	157	62	635

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

Chart 7: Papers in Refereed International Journals 1991-1998



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

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

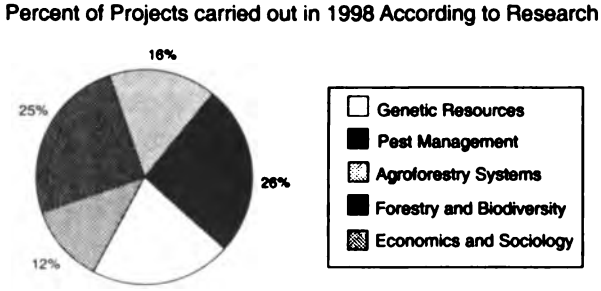
The period from 1997-1998 showed a marked increase in fundraising and projects approved. For more detail see Appendix 4.

Table 11. Research Projects carried out in 1998, according to Research Lines

Research Line	No. of Projects Underway
1. Genetic Resources	14
2. Pest Management	17
3. Agroforestry Systems	11
4. Forestry and Biodiversity	17
5. Economy and Sociology	8
TOTAL	67

This chart compares the number of projects in each of the Research Lines in 1998

Chart 8: Percent of Projects carried out in 1998 According to Research Line



a. Research Line 1: Germplasm improvement and conservation of selected agricultural crops and forest species

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

Under the current Strategic Plan, Germplasm improvement and conservation will be a component that safeguards conservation and supports agricultural and forestry development in the member countries. CATIE will, therefore, enhance and conserve the plant genetic resources of economic importance and introduce valuable genotypes that are important for regional agriculture.
The objective of this research line is to increase, preserve, characterize, document and make available to users the genetic diversity of agricultural crop and forest species with current or potential uses.

During 1997, two new masters students became research assistants in the Biotechnology Unit which meant an increase in existing human resources. For this reason it was necessary to redefine the specialty courses' content. Few students have wanted to participate in the Biotechnology in past years.

In answer to the need for better materials, in 1997 the Director General began a program to update the Biotechnology Unit. After Drs. W. Roca and J. Tohme evaluated the Unit, several documents were produced summarizing the measures that must be taken in research lines, human resources, and external collaboration, as well as in the institutional budget for these activities. The objective is to create a model research Unit in the biotechnology laboratories. This Unit would serve the member countries in the areas of characterization, conservation, multiplication and distribution of agricultural and forest genetic resources. During 1997, Unit organization process was begun. Changes were made in infrastructure and equipment.

Two major characterization programs using biotechnology tools are emphasized. The first is devoted to coffee, and aims at selecting the most interesting varieties, in terms of disease resistance, from specimens collected in the field. The second program's objective is the characterization of the diversity of economically important forestry species. Other species also undergo diversity studies with molecular markers.

The results obtained in the field of coffee micropropagation allowed for the first improved hybrid plants (F1) to be distributed through the regional crop improvement program (PROMECAFE). The future of this activity will be the validation of the results on a larger scale (pilot project) in the next two years.

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

The cultivation of plantain in 1997 and 1998 was marked by the effort to develop an efficient cellular regeneration system through cellular suspensions. This system is indispensable to ensure non-conventional improvement. To ensure this program's future, regional integration is sought with the support of INIBAP. Two projects that will help support this research, the INCO-Musa 1998-2001 program and the BID-INIBAP project, were approved in 1997.

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

selected or improved material, exchange of plant material and cellular regeneration for non-conventional genetic improvement programs.

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

The forest species research program is a program emerging out of the Biotechnology Unit (UB). In 1997 and 1998, both research work and efforts to develop links of regional and institutional cooperation were accomplished. Cooperation with prestigious institutes and organizations such as CIRAD, ORSTOM, IPGRI, INIBAP, ACRI, etc. strengthens the activities related to this research line. Networking through PROMECAFE, REMERFI, etc. is also considered as an important mechanism to enhance research and germplasm interchange in the region.

Four sub-lines of research have been identified:

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

Some of the most striking examples of the research projects done in 1997-1998 within this research line follow.

- Genetic variation in *Swietenia macrophylla* in Central America for conservation, sustainable use and management

The performance of *Swietenia macrophylla* progeny in Costa Rica was evaluated through trials established in the north of Costa Rica's Alajuela province. The Upala and Lagartera trials contain progeny from Costa Rica and the Laberinto trial contains material from six Central American countries and Mexico. Data on root collar diameter, height, survival, and attack of *Hysipyla grandella* were collected. An variance analysis was made for those variables, resulting in highly significant differences in height and diameter but not for *Hypsipyla* attack. Heretabilities at 621 days for Upala were: 0.54± 0.02, 0.55 ± 0.02 and 0.07 ± 0.002 for diameter, height and attack respectively. Laberinto at 251 days presented heretabilities for diameter, height and attack of 0.55 ± 0.008; 0.59 ± .008 and 0.02 ± 0.0006 respectively. CVAG were 12.8 for diameter and 13.76 for height. Trial Lagartera was analyzed at 585 days and heretabilities of 0.09 ±0.005; 0.16 ± 0.008 and 0.12 ± 0.005 for diameter, height and attack were recorded. Low values in this trial were caused by environmental error caused by flooding. Conservation areas for the species are mentioned in the different countries and species management activities are being considered.

- Cryopreservation of embryonic cellular suspensions of *Musa sp.* started from samples taken from immature flowers

Suspension cultures constitutes a valuable technique for the improvement of *Musa spp* as a source of material for genetic transformation, somatic hybridization by protoplast fusion, and massive propagation. Cryopreservation offers a promising alternative for the conservation and management of these suspensions.
In the present study, an existing cryopreservation protocol was optimized for its efficiency in embryogenic cellular suspensions of *Musa* spp., initiated from immature flowers. Four experiments were realized independently using cellular suspensions of cv. Dominico (*Musa* AAB). In each experiment, one of the protocol processes was modified: crystallization induction, pretreatment conditions, cellular recuperation, and pre-growth treatment with sucrose and lactose. The optimized protocol was applied in embryogenic cellular suspensions of *Musa*. Four out of five cultivars withstood cryopreservation (Dominico, SF 265; Currare 3; and Col 49 2.8.)

- Evaluation of the genetic diversity of CATIE's *Pachyrhizus tuberosus* (lam.) Spreng collection using morphological and molecular characteristics

The objective of this research was to evaluate the genetic diversity of CATIE's *Pachyrhizus tuberosus* collection through the morpho-agronomic and molecular characterization of 31 accessions. For the morphologic characterization, a total of 70 qualitative and quantitative characteristics were analyzed. In addition, the size of the minimum sample was obtained and the genetic variability was evaluated. Ten qualitative characteristics and seven quantitative characteristics, with greater discriminating power, were used to identify groups, and samples within groups. For the molecular characterization, RAPD markers were used and by means of the distance matrix, dendograms, "*bootstrap*" and canonical discriminate analysis, the variability of the collection was determined. Ten "primers" were identified obtaining 32 polymorphisms, where seven "primers" were most useful in differentiating between groups, finding duplicates, "labeling mistakes" and characterizing individuals. In addition, correlation based on the distance matrix was used to identify the relationships between both types of characterization.

- Analysis of cacao resistance to *Phytophthora palmivora* (Butl.) Butl using QTL

A great deal of time is necessary for cacao plants to mature sufficiently so that majority of the important traits can be determined. This fact is the main limitation to rapid genetic improvement in this crop. The use of molecular markers opens new possibilities for a faster selection of resistant genotypes, and the opportunity for characterizing the genotypes more precisely.

- Study of genetic variability on a molecular scale of six mahogany samples (*Swietenia macrophylla* King.) from Central America and Mexico

Mahogany (*Swietenia. macrophylla*) is one of the most valuable timber species in the world. It originated in Tropical America, where due to its overexploitation over the last 30 years, many of its natural populations have been lost. The genetic variability at the molecular and quantitative level of 41 families of mahogany from six provenances of Central America and Mexico was studied. For the molecular trial, DNA was isolated from young leaves. The polymorphisms

generated through the RAPDs analysis were used to estimate genetic variability. A greater genetic diversity was detected within the provenances than among them. This was corroborated by Nei and Shannon's indices. The provenances studied were associated in two basic groups: the families from Panama and those from the rest of Central America and Mexico, suggesting that each group has different origin or evolution. The results were compared with a previous study of the progenitors to estimate the effect of forest fragmentation over progeny. They suggested that in Costa Rica and Panama, forest fragmentation has affected genetic diversity. Five quantitative variables were evaluated: plant height, root collar diameter, dry aerial matter, dry root matter, and the ratio dry aerial matter/dry root matter. The quantitative study demonstrated the existence of high genetic variability within and among the provenances. All variables except root length and aerial dry matter/root dry matter showed moderate indices of heredibility.

- Characterization of 97 pepper accessions in the CATIE collection

The objective of this research was to characterize 97 accessions of *Capsicum sp* from CATIEs germplasm collection using agro-morphological characteristics. A total of 70 characteristics were evaluated and analyzed. The analysis obtained 10 groups with 133 sub-accessions using the Gower method and was verified by the X^2 test and show significance with the country and specie. The discriminate value from 70 characters obtained a value of 46 with the highest discriminate value. Thirty-two qualitative (significance at 1% by X^2 test) and 8 quantitative characters were selected by the "D" Engels Index. The agro-morphological characterization showed phenotypic variation, gave value to the conserved germplasm and made it available to research programs.

- *In situ* bean (*Phaseolus vulgaris*) conservation in farms in Cajamarca, Peru

In Peru, agrodiversity development activities *in situ* conservation strategies have been the focus of a variety of institutions. In 1995, CIAT, began to coordinate activities with national and non-governmental organizations to maintain bean genetic diversity on farms. Following an anthropological approach, the present study seeks to support this initiative continuing research to identify the main reasons farmers conserve bean mixtures. As a result of interviews, it was discovered that half of the farmers still cultivate mixtures, use different types of bean seeds and recognize agronomic advantages such as diseases resistance, good yields and precocity. However, farmers are tending to abandon mixtures because other factors are influencing their conservation, such as economical aspects, grain quality and seed availability.

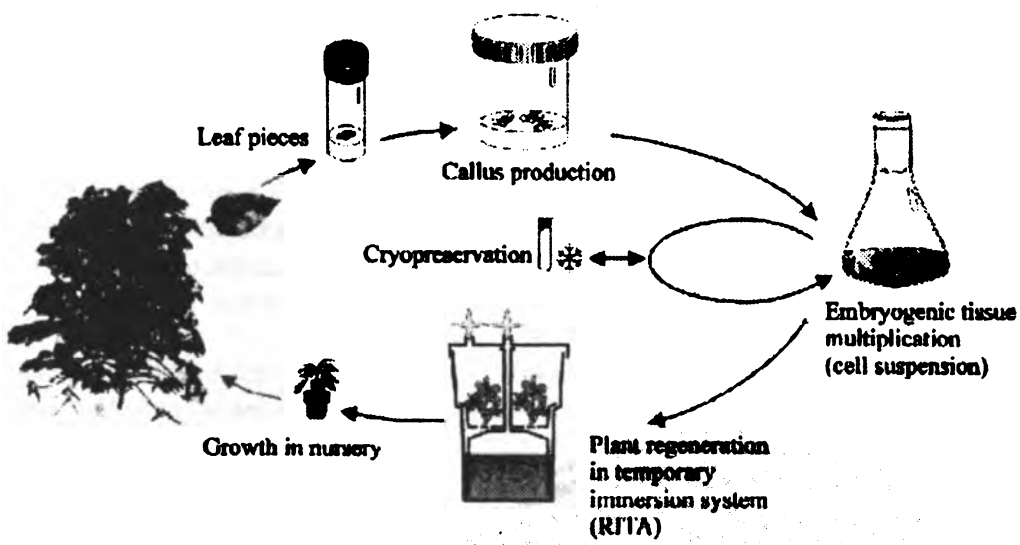
- Coffee Hybrids Developed in Conjunction with PROMECAFE and CIRAD

New highly productive, disease resistant hybrids have been developed. These activities have been carried out with as a combined effort with PROMECAFE and CIRAD, France. Thousands of young plants, engineered through these efforts, can currently be found being grown and tested in the member country coffee institutes.

- Plant regeneration by direct sowing the somatic embryos of *Coffea arabica* mass- produced in a bioreactor

In order to sow *Coffea arabica* L somatic embryos directly in the soil, the effect of germination conditions on their morphology was studied. The embryos were mass-produced in a bioreactor with temporal immersion (RITA,). Once germinated, the development into

plants of the directly planted embryos was highly successful. Densities higher than 1,600 embryos/11-bioreactor positively affect the embryo morphology provoking an important lengthening of the embryonic shaft (+4-5mm). At this density the use of a high concentration of sucrose (234mM) two weeks before planting stimulated an efficient development of the embryos to plants (78%) and vigorous plant growth in regenerated plants. In addition, direct planting reduced the labor hours by 13% and reduced space necessary in the *in vitro* culture area by 6.3% compared that necessary for the conventional acclimatization method of plants cultured in gel media.



b. Research Line 2: Agroforestry and forestry integrated pest management

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

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

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

Three sub-lines of research have been identified:

- Pest and biological control agents inventory in agroforestry and forestry systems.

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

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

The Nicaraguan IPM Project, financed by NORAD, extended its coverage to include 1400 men and 450 women in an effort to transfer and evaluate IPM practices. The by crop type participatory focus has also been tested in agroforestry projects and will be used in the new program that was presented to the donor agency. The impact studies have shown that participatory demonstration and evaluation of IPM practices, by crop type, based on variable pest ecology, results in more effective extension work and better pest management on the part of the producer.

The participatory planning methods have improved in the IPM counterpart institutions in Nicaragua. This new focus can strengthen the planning processes with the permanent associates which is key to the success of CATIE's participatory research and technology evaluation strategy. These methods include bilateral as well as multilateral strategies.

With the support of the IPM Project in Nicaragua, manuals were prepared for integrated pest management in coffee, vegetables and plantain. These manuals combine management practices with ecological information that improves the quality of the extension work while considering the varying abilities of the producers to improve their decision-making processes.

The Integrated Pest management research results were presented in various scientific meetings. These included the Regional IPM Conference in Matagalpa, Esteli and Leon, Nicaragua; and the Nicaraguan IPM Conference in November where 17 papers were presented. Additionally, five papers were presented in the XVIII Latin American Coffee Symposium in Costa Rica. A delegation participated in the annual Central American and Caribbean workshop on the white fly which took place in the Dominican Republic in November; and nine papers were presented at the Meeting of the Caribbean Section of the American Pathology Society, which took place in Costa Rica.

The following are some examples of specific research projects completed during the 1997-1998 period in this research line.

- Potential of biological control for pest management in sustainable agricultural systems

  Results of bio-control research on insects, weeds, nematodes and plant pathogens are presented. Promising entomopathogenic fungal strains and application methods were determined, for use against *Cosmopolites sordidus* and *Anthonomus eugenii*. *Bacillus popilliae* isolates. Those with potential against *Phyllophaga elenans* and *P. menetriesi* were also selected. A similar selection was carried out for weed pathogens against *Rottboellia cochinchinensis*, finding promising native fungal isolates. A series of antagonistic micro-organisms and soil amendments were tested to induce systemic resistance, to control or to decrease severity of

plant diseases caused by *Geminivirus, Pseudomonas solanacearum,* and *Phytophtora infestans* in tomato; *Mycosphaerella fijiensis* in banana; and *Rosellinia bunodes* in coffee plants. In all cases promising results were obtained both in greenhouse and field conditions. Coffee, tomato and *Musa spp* plant growth was improved when nematode infested soils were treated with endomycorrizic fungi.

- Collection of *Bacillus popilliae* from the tropical and sub-tropical Americas

A collection of *Bacillus popilliae* strains, collected in Colombia, Costa Rica, Nicaragua, Honduras and Mexico, was established as part of a program to develop new *Phyllophaga spp.* control methodologies in Tropical America. The strains were isolated from the larvae of several Scarabaeidae species. Many of the strains have be proven against different species of *Phyllophaga* which is of tremendous importance in Central American agriculture for its potential in the microbiological control of these pests.

- Efficiency of live ground covers in the management of the white fly (*Bemisia tabaci*) as a geminivirus vector in tomatoes

A management scheme for the *B. tabaci*-geminivirus complex, which is based upon minimization of contact between the vector and the host plant, is being pursued in Costa Rica. Three-years of field data on transplanted tomatoes have shown that two living ground covers associated with the crop, "cinquillo" (*Drymaria cordata*, Caryophyllaceae) and coriander (*Coriandrum sativum*, Umbelliferae), have the following effects: 1) they significantly reduce the number of adult whitefiles; 2) they delay geminivirus diffusion; 3) they decrease disease severity; 4) and they provide yields as high as 27-30 t/ha, with very satisfactory net benefits. The main advantages and disadvantages of this approach are discussed.

- Anti-feedant effects of some plant extracts on *Hypsipyla grandella* larvae

The inhibiting effect of some plant extracts on the mahogany shoot borer (*Hypsipyla grandella*) larval feeding and growth was studied. A general screening with 29 substances was carried out on *H. grandella* third instar larvae, by exposing them to *Cedrela odorata* leaf discs impregnated with one concentration of each substance (10%). Six substances with possible anti-feeding or inhibitory effects on growth were selected, and treatments were arranged in a completely random design. Substances were: bitterwood (*Quassia amara*) wood and leaf extracts, common rue (*Ruta graveolens*) leaf extract, *Sechium pittieri* fruit extract, and two commercial products (Azatin and Nim 80) derived from the "neem" tree (*Azadirachta indica*, Meliaceae). In addition, a greenhouse experiment was carried out in which terminal shoots of *C. odorata* plants were treated with the same concentration (10%) of each substance and exposed to three first instar *H. grandella* larvae. Plants were distributed in a completely random design, with a split plot arrangement through time, with 10 plants per treatment. The bitterwood wood extract showed anti-feedant activity and Azatin caused direct larval mortality; a few attacks were observed in plants treated with the common rue extract. The bitterwood leaf extract, Nim 80 and *S. pittieri* extract showed no activity as either anti-feedants or growth regulators. Laboratory bioassays with increasing concentrations (0,1, 0,316, 1,0, 3,162 and 10%) of each extract confirmed the anti-feedant activity of both bitterwood extracts, as well as that of common rue foliage.

- Effect of fungicides on *Beauveria bassiana*.germination and growth

The effects of fungicides on growth and germination of *Beauveria bassiana* was evaluated under laboratory conditions. The results demonstrated that the fungicides Benlate, Curzate, Acrobat, Daconil, Antracol and Dithane have an inhibitory effect over the fungi germination and growth. The fungicides Aliette, Previcur and Kocide did not affect the growth and the germination of the fungus in a significant way.

- Evaluation of growth promoting and resistance inducing microorganisms in banana (*Musa sp.*)

This study evaluated ten treatments, which included six plant growth-promoting and induced resistance microorganisms, one organic amendment, two micorrhycic fungi and two controls, one for each type of substrate used. Their capacity to increase growth in banana plants and resistance to black leaf spot disease was measured. The experiment was conducted in two stages, first in the greenhouse, and later in pots in a field highly affected by the disease. In the first stage, results did not show clear differences in growth variables, except in bocashi and *Pseudomonas cepacia*, which showed advantages to increased leaf area and plant height. In the second stage, the treatment with bocashi again had the greatest increases in growth variables. However, *Pseudomonas fluorescens* and *Trichoderma harzianum* also achieved good results. *P. fluorescens* significantly decreased the disease's severity.

- Mycorrhizal fungi: an option for ***Meloidogyne exigua*** management in coffee

The interaction between two vesicular-arbuscular mycorrhizal fungi *Entrophospora colombiana* and *Gigaspora margarita* and the root-knot nematode, *Meloidogyne exigua* and their effects on the growth of coffee plants was studied. Both mycorhizal fungi decrease the multiplication rate of *M. exigua* and the gall index. The plant's foliar area and dry weight were greater with *Gigaspora*.

- Micorrhizal fungi and compost: Alternatives for the ecological management of *Radopholus similis* in banana

This study was carried out with the purpose of evaluating three endomycorrhizal fungi and one organic amendment and their effects on the growth of banana plants from *in vitro* culture. Also studied were their bio-control properties against *Radopholus similis*. The endomycorrhizal fungi were *Glomus occultum, Entrophospora colombiana* and *Gigaspora margarita*. Compost used as an organic amendment increased water content and significantly improved plant growth. Symbiosis encouraged tolerance to *R. similis* through the compensation for nematode damage, increase olant nutrition absorption, and endomycorrhizal fungi-nematode competition for space and nutrients at the radical cortex level. The endomycorrhizae provoked significant modification in cellular morphology. The arbuscles developed densely within cortical cells. *R. similis* provoked cytoplasm invagination and nuclear growth.

- Evaluation of the effect of native pathogens and stress factors in the control of ***Rottboellia cochinchinensis***

The biological control strategy against *Rottboellia cochinchinensis* using native pathogens and the results obtained from investigations are discussed. During the first phase of these

investigations, native pathogens with potential as biological control agents were identified, and in the second stage, studies with stress factors to increase the severity of the pathogens were conducted. Strains 69 and 127 (*Fusarium* sp) together with sub-doses of the herbicide haloxifop, demonstrated potential as control agents of *R. Cochinchinensis*.

- Participative IPM implementation in several Nicaraguan coffee plantations

The CATIE/INTA IPM program in Nicaragua collaborated with national institutions, the national coffee organization, and NGOs to develop a participatory model for the widespread multiplication of coffee IPM with farmers, extensionists, and specialists. The project team first worked with 10 groups of coffee growers to field-test a participatory training sequence at key crop stages. Simple methods were developed for training on major pests. The project team then developed a parallel process for extensionist training which also followed critical crop stages in farmer decision-making. Over 150 extensionists met every two months during the year to strengthen their facilitation skills and expand their ecological understanding of pests and natural control. Evaluations showed that farmers and extensionists had improved knowledge and abilities for pest management.

c. Research Line 3: Tropical Agroforestry Systems for Hillsides, Frontier and Degraded Lands

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

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

This research line emphasizes the improvement of agrosilvicultural, silvopastoral and agrosilvopastoral systems for small and medium producers. It focuses on the bio-physical and socio-economic evaluation of these systems and the selection of the tree components. Particular attention is given to the study of the interactions between the components (crops, trees, pasture, light, nutrients, macro and micro-fauna, cattle and soils) and the users. Soil-crop-tree-human and soil-pasture-tree-animal-human interactions are especially important for this line of work.

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

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

During 1997 and 1998, the silvopastoral system research priority changed from an emphasis on forage trees to one of reforestation of degraded pastures, integrating multiple use trees with timber trees. Studies were done in Panama and Costa Rica on existing Acacia mangium, Gliricidia sepium or Erythrina berteroana silvopastoral systems with pastures of Brachiaria to determine their potencial for recovering marginal soils. Cratylia argentea is a leguminous shrub well adapted to infertile, acid soils and produces significant quantities of forage in the dry season. Ruminant consumption of fresh forage is low but can be significantly increased when the forage is first wilted or mixed with molasses. Substituting 33 and 66% of the commercial concentrate with morera (Morus alba) for milk calves resulted in daily weight gains of 0.67 and 0.53 kg/day respectively. Nevertheless, there was no significant difference between these treatments. Ruminal fermentation parameters of three tropical grasses (Hyparrenhia rufa, Pennisetum clandestimum and Brachiaria brizantha) were improved by increasing the morera levels in the diet.

Other significant research targets are existing "traditional" agroforestry systems (coffee with shade, Taungya and silvopastoral systems) and recently developed systems (alley cropping and live barrier systems with annual food crops, live fence post systems), and in particular the ecological and socio-economic issues.

By combining traditional planted fields with alley cropping, the benefits of each crop are markedly increased because underground crop competition is reduced, and the nutrient release process in the accumulated organic matter is accelerated. Information from the root architecture (of the trees and the crops) suggest that the competition for nutrients and water can be controlled by means of species selection and crop management (simultaneous harvesting and plowing). One organic amendment evaluation in Turrialba showed interesting results: "Bocashi" and other animal manures were the best phosphorus source. Using these amendments, it was possible to produce annual crops, even in extremely acid or infertile subsoils that had no bases but had a high aluminum content. More research is necessary to determine the effect of the trees associated with soil acidity and the availability of crop nutrients. There was also a dynamic production model designed for biomass and nutrients in bracatinga (Mimosa scabrella) in natural green manure.

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

The following are examples of some of the research carried out in CATIE in the 1997-1998 period in this research line.

- Capacity of nitrogen fixing trees to supply nutrients to maize in Costa Rica's base-deficient soils

  Nutrient content was compared in: *Gliricidia sepium* (Jacq.) Walp.; *Inga edulis* Mart.; *Canavalia ensiformis* (L) DC; *Mucuna deeringiana* (Bort.) Small; *Calliandra calothyrsus* Meissn.; cow and chicken manure; and bocashi, a compost that contains 36% soil, 18% rice husks, 18% carbon, 3.6% calcium, 18% molasses, and 6.4% rice chaff. A material analysis was conducted on the soil and the maize: 20, 40 and 60 days after planting. The animal materials showed the best results, due mainly to their higher phosphorus and calcium content, elements in which these soils were seriously deficient.

- Green manures as a nutrient source in a tropical hillside agroecosystem in Colombia

Field and laboratory experiments carried out in El Pescador, Valle, Colombia and in the CIAT facilities in Palmira, Colombia evaluated the capacities of firewood and non-firewood species to supply N to rice (*Oryza sativa*). The liberation rates were, in decreasing order: *Indigofera constricta* >*Mucuna deerengianum*>*Mucuna pruriens* var. Brunin>*Tithonia diversifolia* = *Canavalia brasillensis* > *M. pruriens* var. Tlait> *M. pruriens* var. IITA >*Cratylia argenta*. The rice received the highest quantities of N from: *M. deerengianum, M. pruriens* var. Brunin, *T. diversifolia* y *C. brasillensis*. These materials also had N content, higher levels of *in vitro* digestibility, and lower lignine/N and (lignine+poliphenoles)/N ratios.

- Timber species for shade in new and old cocoa fields

Shade diversification in new and old cacao fields in Talamanca, Costa Rica and Bocas del Toro, Panama were evaluated, comparing three timber species and one "service" species as the control. Changing non-timber shade trees to timber is a highly profitable investment given that it does not affect the cacao fields in such aspects as: mortality, diametric growth, architecture and production. The cacao- salmwood (*Cordia alliodora*) association was the most economically viable of those tested.

Key words: *Cordia alliodora*, Costa Rica, financial analysis, *Inga edulis*, Panamá, *Tabebuia rosea, Terminalia ivorensis, Theobroma cacao*, timber growth

- Available ground water in a *Coffea arabica-Erythrina poeppigiana, C. arabica-Eucalyptus deglupta* and *C. arabica* monoculture plantations

Available ground water at depths of 0-15, 15-30, and 30-40 cm was evaluated in *Eucalyptus deglupta* or *Erythrina poeppigiana* coffee plots, with and without shade, during the dry season in Costa Rica's Central Valley region. Available ground water for the plants was always higher in the *E. poeppigiana* systems and in those without shade in comparison with the *E. deglupta* systems. The permanence of available water at 30-60 cm descended to levels at or below the permanent wilt coefficient (15 bars) in all systems. The permanence of available water in the top 30 cm, where the most absorbent coffee roots are found, avoids the plants death by hydric stress.

- Productivity, labor and variable costs of organic versus conventional coffee growing in small-holdings in Costa Rica

Productivity, labor, variable and priority costs, limitations and some research topics defined by producers were compared among 10 organic and 10 conventional coffee fields in Costa Rica. Due to high productivity in five conventional coffee fields, these produced approximately 25% more coffee/ha on average over three years than the organic group. Nevertheless, five organic farms had higher production than their conventional partner. Although the organic group used more labor, (691 hours vs. 495 hours/ha/year), the cost variables were similar for both groups. The key limiting factor in both groups was low, unstable coffee prices.

- Costa Rican farmers' experience with the timber tree introduction in their coffee plantations

Farmers in Perez Zeledon, Costa Rica have a clear preference for *Eucalyptus deglupta, Terminalia amazonia* y *T. ivorensis* as timber species used for shade in their coffee fields. *Gmelina arborea* was identified as the least advantageous species. Their preferences are based mainly on ease of tree management and their effects on the coffee. The farmers believe that the reforestation program using incentives to plant timber trees in association with coffee does not completely fulfill their expectations, since for them, coffee is the main component in an agroforestry system.

- Forestry incentives to establish and manage timber trees in coffee fields

This study was conducted in Grecia, Costa Rica using surveys and interviews with farmers, and growth measurements of timber trees planted in association with coffee. The most important limiting factor found was inappropriate planting density used by the farmers that received incentives. This density corresponds to pure forest plantations and is not appropriate for agroforestry systems (coffee/timber combinations). As a consequence of these inappropriate planting recommendations, tree growth was better in the farms that had not received reforestation incentives.

- Effect of woody and herbaceous legumes on the growth and nutrient content of two tropical grass species

A factorial experiment (2 X 2 X 5) was conducted with two gramineas species *Panicum maximum* Jacq. (Var. CIAT 16061) and *Brachiaria humidicola* Rendle (Var. CIAT 679) in mono-crop or in association with *Centrosema macrocarpum* (Benth). There were five types of mulch added: 1) none; 2) *Erythrina poeppigiana* (Walp.) O.F. Cook (138 g pot^{-1}) to give 150 kg N ha^{-1}; 3) *E. poeppigiana* (276 g pot^{-1}) to give 300 kg N ha^{-1}; 4) *Acacia mangium* Will. (86 g pot^{-1}) to give 150 kg N ha^{-1}; and, 5) *A. mangium* (173 g pot^{-1}) to give 300 kg N ha^{-1}. The best growth with the highest nutrient content was obtained with the highest level of *E. poeppigiana* in association with *C. macrocarpum*. Nevertheless, the *A. mangium* mulch also had a significant effect on control. The *C. macrocarpum* also had a positive effect.

- Ecological contribution of forage tree tannins on bovine nitrogen use

This study was conducted on CATIE's experimental farm in Turrialba, Costa Rica to determine the effect of feeding forages, with contrasting tannin concentrations, on N utilization in young bulls. The treatments were different supplements of *C. calothyrsus* and *Gliricida sepium* (0: 100, 33: 67, 67: 33 and 100: 0), where increasing levels of *C. calothyrsus* simulated increasing tannin levels. *C. calothyrsus* had lower *in vitro* DM digestibility (30.2 vs 62.1%) and higher condensed tannins (18.5 vs. 1.8 g kg DM $^{-1}$) than *C. sepium*. As the level of *C. calothyrsus* increased: N intake decreased as did urinary N, N retained and N absorbed whereas fecal N, and the efficient use of absorbed N increased. The use of a mixture of forage with contrasting tannin concentrations contributed to increased efficiency of absorbed N and modified pathways of N excretion in ruminants.

- Production and quality of *Brachiaria humidicola* forage as a mono-crop and in association with *Acacia mangium* in the acid soils of the humid tropics

This study was conducted at the IDIAP experimental station of Calabacito, Panama (mean annual rainfall 2500 mm and temperature 27 °C; acid soils with high Al saturation), to determine the effect of the timber tree *Acacia mangium* on the productivity and quality of *Brachiaria humidicola* pastures. The treatments were: 1) *B. humidicola* mono-crop; and 2) *B. humidicola* mixed with *A mangium*. The forage had significantly lower crude protein concentration (32 vs 46 g kg^{-1}) and solubility (52 vs. 58%) in the mono-crop field than in the mixed field, respectively. Mean total forage yields of the mixed crop field was 28% higher than the mono-crop field. In the dry season, dead pasture bio-mass represented 60% of total dry matter measured in the mono-crop field whereas it was only 30% for the mixed crop field. The leaf: stem ratio of *B. humidicola* was higher for the mixed crop field. It can be concluded that integrating *A. mangium* with *B. humidicola* in silvopastoral systems contributes to increased pasture yield with higher nutritive value.

- Control of lateral root extension of fast-growing timber species using grasses as biological barriers

The potential of five gramineas species as biological barriers to reduce lateral competition in agroforestry associations with fast growing timber species such as *Eucalyptus deglupta* and *Cordia alliodora* was investigated. The roots of six-month-old *C. alliodora* saplings grew toward the side against the barriers while the *E. deglupta*, although it showed different types of interaction, generally crossed the barrier. Growth of both tree species, in association with the gramineas, was lower than in the control group. The barrier effect of the gramineas could be improved through establishing several rows instead of one or by reducing the planting distance between each row.

- Quantification of stored carbon in a silvopastoral system in Costa Rica's Atlantic zone

Silvopastoral systems are considered potential carbon (C) sinks that might help to mitigate the effects of increasing global C emissions. In a case study in the Atlantic Zone of Costa Rica, a medium-low fertile Typic Tropofluvent soil stored 233 t C ha^{-1} in the upper 50 cm under pure green Panic pasture (*Panicum maximum* Jacq.). In association with three different growth stages of natural regeneration of salmwood (*Cordia alliodora* Ruiz&Pav.) Oken; <3, 3-7, >7 years), the soil was less fertile and stored similar amounts of between 180-200 t C ha^{-1}. C concentrations decreased with soil depth and distance from the tree. Variability of C distribution increased with soil depth and age of the stand.

d. Research Line 4: Development of technologies for the sustainable management of forests and their biodiversity

Over the past 50 years, CATIE has become a clear leader in tropical forest management, plantation silviculture and biodiversity management and conservation. Besides providing benefits to society, adopting forest management practices for diversified production will contribute to a marked improvement of the family incomes of farmers living in the frontier zone. Recent studies have shown that these people are organized to work at a family or community level, making these practices even more impacting.

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, bio-types or ecotypes and studies of a preliminary diagnostic nature. Overall, these have been insufficient for establishing guidelines for biodiversity utilization. They have rarely been complemented by the ethnobotanical or economic botany studies which would be necessary if appropriate management of biodiversity products is to be developed.

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

The following research sublines have been defined:

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

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

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

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

The following are examples of some of the research projects done at CATIE in the 1997-1998 period in this research line.

- Progress in the domestication of *Voshysia guatemalensis*

Vochysia guatemalensis Sm., J.D. is a fast-growing timber tree, found naturally in wet lowland areas from southern Mexico to Panama, and usually forms pure stands. Due to its fast growth

and good trunk formation, it is being planted increasingly, mainly in Costa Rica. During the last 10 years, CATIE has implemented a number of activities aimed at domesticating this species. These activities include the selection of plus trees, the assessment of genetic variation through provenance/progeny tests, establishment of seed orchards, capture of selected genotypes using vegetative propagation techniques and studies on seed storage and germination. Field tests have also been established to evaluate the performance of both clonal and seedling material, under different silvicultural systems. In this article, the advances in the domestication process of *V. guatemalensis* and the main research results are highlighted, and suggestions are given for the future development of the domestication strategy.

- Capacity and risks of forest activities on carbon storage and biodiversity conservation in private farms in central Costa Rica

The payment of environmental services (PSA) in forest ecosystems is an innovative Costa Rican mechanism designed to recognize the contribution of forest's owners in protecting forest services. A 1996 Law, established the financial and institutional mechanisms needed to implement this payment system in private farms for the protection and management of natural forests and forest plantations. This study selected and evaluated criteria and indicators (C&I) from biological, economic and social perspectives, to determine the benefits and risks associated with different forest ecosystems in protecting biodiversity and carbon sequestration services. The study also integrated evaluations from different sectors (scientific and land owners), in order to facilitate decision making processes in PSA.

- Seed removal and seed dispersal in two selectively-logged forests with contrasting protection levels in Costa Rica

Seed removal and the fate of removed seeds (as a measure of dispersal) were evaluated in two tropical rain forest sites in the Caribbean lowlands of Costa Rica. Both sites had been selectively logged but differed in their degree of protection from human intrusion (due primarily to hunting) and habitat connectivity. Differences between sites, in rates of seed removal and the fate of removed seeds, were expected, and it was predicted that secondary seed dispersal rates by mammals would be highest at the protected site. Seed removal patterns under two protection treatments (semi-permeable cages *vs.* un-caged) varied both within species across sites, and within sites across species, suggesting differences in the abundance of vertebrate seed consumers between the two sites. However, these differences were largely species specific. For all species combined, twice as many seeds were dispersed at La Selva after 50 days of observation. We found evidence for differential seed survival in our study species between sites, probably related to altered mammal community composition, probably as a result of hunting pressure and loss of habitat connectivity at Tirimbina which affected La Selva.

- Effects of devitalization of trees through silvicultural treatments without using arboricides in latifoliate rain forests

Following the proposal of an operational technical framework for forestry management, the study shows the application of post-harvest silvicultural treatments. This activity has been implemented in different research sites, operational management areas and forests under management in general. The treatment eliminates undesirable vegetation and promotes favorable conditions for future desirable vegetation. Undesirable mass is removed through

devitalization, basically using the ringing technique. At the beginning, tasks were carried out by applying tree fertilization, that is, 100% of the individuals treated. No application of these products is presently promoted, which meant a rate of 90% devitalization.

- Phenological elements for *Quassia amara* silviculture in Talamanca, Costa Rica

Quassia amara is a tropical shrub used as a medicinal plant or natural insecticide, and whose silviculture for diversified forest management is studied by CATIE. In Costa Rica the species is found below 450 m.a.s.l. in areas where soils remain moist all year round. Populations are denser in sunny areas, whereas in very rainy locations, the shrub only grows at higher altitudes. During one year, growth, flower, fruit and seed production of *Q. amara* plants of a natural population in Talamanca, Costa Rica, were measured and the data was correlated with topographic and light conditions. Shrubs produce flowers and fruits under all light conditions, but shrubs with greater basal diameter (> 65 mm) and intermediate light exposure (20-80 % of tree crown receiving direct vertical light) produce more intensively and for longer periods. Higher light exposure levels did not produce significant changes, but rather had a tendency to decrease flower/fruit production. Maximum averages were 1,112 flowers and 135 fruits per shrub through 180 phenological activity days. Topographic conditions had no effect on phenology but affected annual diametric increase; this was great for shrubs on mountain peaks or slope terraces. Diametric increase was greater for flowering shrubs under intermediate light exposure conditions or for non flowering shrubs with maxim light exposure (4.14 mm). Illumination control appears to be a fundamental factor for the species integration in diversified forest management.

- Response of *Carludovica palmata* to several different leaf harvest intensities

Two tests were established to determine the effects of harvesting new (spear) leaves in a natural population of *C. palmata*, a non timber forest resource used as a handicraft fiber. In the first test, two harvest intensities (0 and 100% of spear leaves) in plants from five size categories (based on number of shoots per cluster) were practiced. In the second test, three harvest intensities (0.50 and 100%) in plants from one size category were practiced. These treatments were conducted monthly during a period of eight months. The effects of the treatments on plant growth and fruit setting, and the production and dimensions of new spear leaves were evaluated. There were significant differences from basal cluster perimeter, petiole length, number of old leaves and spear leaves dimensions between plant size categories. During the eight months of sampling in the second test, the treatments showed a significant effect on the number of old leaves (less in harvested plants than in untouched plants), and number of fruits (more in harvested plants). In the first test, there was a significant effect on number of old leaves. The treatments did not have significant effects on the time of emergency, production and dimension of new leaves. It is suspected that clusters had sufficient reserves to replace the losses of leaf area caused by harvest during the test period.

The highest fruit production was from February to April; up to 23 infrutescences per plant in March, decreasing to the lowest point in August with 0.2 infrutescences per plant. Greatest leaf production was when less fruit was present, and the lowest was before April. It is recommended that leaf harvest be done from June to September, during the highest leaf production and that only bigger individuals be harvested.

- Natural regeneration in pure and mixed native species plantations

Natural regeneration and understory light availability was measured in two plantations of pure and mixed designs in the humid lowlands of Costa Rica. The plantations consisted of 8 native species: Plantation 1: *Jacaranda copaia, Vochysia guatemalensis, Calophyllum brasiliense* and *Stryphnodendron microstachyum*; Plantation 2: *Terminalia amazonia, Dipteryx panamensis, Virola koschnyi* and *Albizia guachapele*. In Plantation 1, at 3 and 7 years forest tree invasion was higher under *V. guatemalensis*, while shrubs were more abundant under *J. copaia* and under mixed-species treatments. In Plantation 2, at 5 years the mixed treatment had the highest number of herbaceous understory species, while *D. panamensis* had the highest understory biomass. At 7 years, *V. koschnyi* and *T. amazonia* had the highest number of woody species. Competition for grasses is a major factor influencing woody invasion under these plantations. High accumulation of litter on the plantation floor may contribute to diminished grass growth and thus encourage woody invasion under the species' canopies.

- Development of preliminary growth scenarios for *Tectona grandis* and *Bombacopsis quinata* on plantations in Costa Rican

Projects and private companies in Central America urgently need relevant information on the growth and productivity of priority species used in reforestation, such as *Tectona grandis* (teak) and *Bombacopsis quinata* (pochote). The main objective of this study is to develop preliminary forest management proposals for *Tectona grandis* and *Bombacopsis quinata* plantations to ensure high stand productivity. In the preliminary growth scenarios for teak, rotation periods between 25 and 28 years were evaluated, with final densities of 97 to 125 trees/ha, average diameters of 45 to 50 cm, and total average heights of 30 to 34 m. The productivity at the end of the rotation varies between 10.2 and 13.3 m^3/ha/year, yielding a total volume of 270 to 380 m^3/ha. For pochote plantations, scenarios were developed for rotation periods between 24 and 29 years, using final densities between 110 and 130 trees/ha. Expected results include trees with average diameters of 45 to 52 cm, and total average heights of 30 to 35 m, equivalent to a total volume of 220 to 331 m^3/ha, and an annual productivity rate of 9.0 to 11.3 m^3/ha/year.

- Carbon accumulation in mixed and pure plantations in the humid tropics

Proper design and management of plantations can increase biomass accumulation rates, making them more effective carbon sinks. The study compared biomass production and carbon sequestration by three 6-year-old native tree plantations in pure and mixed-species plots in the Atlantic humid lowlands of Costa Rica. In Plantation 1, *Vochysia guatemalensis* the highest levels of carbon accumulation (40.2 Mg C ha^{-1}) were found followed by *Jacaranda copaia* (40.1 Mg C ha^{-1}) and the four-species mixed stands (39.0 Mg C ha^{-1}). In Plantation 2, the mixed plantations and *Dipteryx panamensis* (19.9 and 19.57 Mg C ha^{-1}) had the highest carbon accumulation. Plantation 3, *Hyeronima alchorneoides* had the highest values (15.8 Mg C ha^{-1}) followed by *V. ferruginea* (13.4 Mg C ha^{-1}) and the four-species mixture (11.4 Mg C ha^{-1}). The results suggest that several native tree species in the region have a potential for high carbon accumulation and that changing plantation design can increase the biomass accumulation rates of tree plantations.

- MIRA an information management system for monitoring tree growth in forestry and agroforestry research

The MIRA system manages data on climate, study sites, soils, forest species, seed sources, tree measurements, and the production of various forest products. The MIRA network of study plots and statistically designed experiments under a wide variety of climatic, edaphic and topographic conditions and management practices has made possible valuable silvicultural research and technology transfer. The MIRA system has provided the source data for numerous scientific publications, including growth and yield models for multi-purpose tree species. The system allows information storage and integration, to promote the exchange of information, and to create networks between researches, projects, companies, countries or regions.

- *Vochysia guatemalensis, Vochysia ferruginea* and *Virola koschnyi* seed valuation

Vochysia guatemalensis, Vochysia ferruginea and *Virola koschnyi* are wet tropical forest species which grow at elevations below 800 masl along the Atlantic coast of Central America. All three species are becoming increasingly important in reforestation projects, but there is a lack of information on the requirements for seed storage and germination. The present experiments were carried out in CATIE's Tree Seed Bank laboratory in Turrialba, Costa Rica, with replications at the Danida Forest Seed Centre, Denmark, and at the Section for Horticulture, the Agricultural University, Copenhagen, Denmark. The methodology was based on the protocol of the project on 'Handling and Storage of Recalcitrant and Intermediate Tropical Forest Seeds' coordinated by IPGRI, Rome. Results showed that *V. guatemalensis* and *V. ferruginea* seeds are desiccation tolerant. *V. ferruginea* showed a 93% germination rate after drying to 6.4% moisture content and *V. guatemalensis* showed a 96% germination rate after drying to 5.9% moisture content. *V. koschnyi* does not tolerate desiccation below 20% moisture content.

- Ecosystem biodiversity in lowland tropical rain forests of Central America: characterization and land management applications

The level of ecosystems is important in biodiversity measurement and in conservation and forest management planning. Nevertheless, systematic studies conducted to measure biodiversity in Central American ecosystems and examine their planning potential have rarely progressed further than the natural formations determined by macroclimate variations. These formations can be subdivided into different hierarchical levels with relation to the distribution of hurricane impact, extreme substrate moisture regimens and local condition variations. A preliminary analysis indicates gaps in the regional biodiversity found in protected areas. The differentiation of different forest types within forest management units in the region can be quite marked and perhaps even more so in the understory. Among the practical methods that can be used by forest administrators to identify forest types is inventory data analysis of soil types or physiographical units.

e. Research Line 5: Socio-economic analysis and valuation of policies, and environmental goods and services from tropical ecosystems

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

The current problems related to the economical and environmental sustainability of the areas and production systems, the sustainable use of natural resources, and the conservation of the environment are owed in part to the lack of economical and socially appropriate alternatives for Tropical America's families and rural communities.

Nevertheless, this problem is rooted deeply in society's structural and macroeconomic policies. In many cases the appropriate technologies already exist, but the usual incentive or disincentive systems or the institutional environmental policies do not favor their adoption. A permanent and global solution must also be adapted to these critical aspects in such a way as to promote individual conditions that are compatible with sustainable and environmentally healthy development; which is the goal of all the CATIE member countries.

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

The following research sublines are addressed:

- Economic valuation and analysis of goods and services from tropical ecosystems,
- Socio-economic evaluation of policies affecting the utilization and management of tropical ecosystems, and
- Socio-economic analysis of the processes involving the technological changes occurring in tropical ecosystems.

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

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

A relatively important by-product is the economic valuation of the natural resources that are publicly available as well as the goods and environmental services produced by them such as carbon fixing, water filtration and storage, biodiversity conservation, ecotourism etc. At the same time, and perhaps more importantly, the negative impacts caused by the methods used for their exploitation (pollution, net losses in the natural resources reserves, etc.) can be evaluated. These are the bases for the formulation of policies that promote their rational use.

There is a terrible lack of information necessary to guide development and technological transfer methodologies to be more efficient and effective under the specific conditions present in the region. There is also little understanding of the socioeconomic factors that limit the adoption of

technologies and dissemination processes. The needs are felt in the farming families, their own knowledge and ways of experimenting and their general priorities which are frequently ignored at the time of defining the topic, objectives and research and extension methods.

During the report period, 24 different data collection activities, trials and up-dates were carried out in this line. Additionally, 9 research methods were adapted or validated for their use in the analysis or evaluation of the economic or social processes in the member countries. Some results of this research are:

In the field of monitoring and economic valuation of carbon capture, there have been studies started to measure the carbon content in the high oak forests of Costa Rica. The results show a total of 43% including roots, trunk, branches and leaves which contrasts with the 48-52% normally reported in the literature.

Other studies have determined the function of the growth of the most important species used in Costa Rica's forest plantations, with which projections have been made on the quantity of fixed carbon in this type of plantation. In addition this aids in the financial and economic calculation of the optimal harvest rotation for the species. In this way there have been estimates made for Costa Rica over a stable area of 128,000 ha of mixed species plantations that are cut and planted *ad infinitum*, where a consistent level of 8.4 tons of fixed carbon is maintained.

Under a proposal from Costa Rica to the international community, carbon fixing should have an economic value that oscillates between 84 and 168 million dollars every 20 years; that is to say US $33-66/hectare.

An inventory and analysis was done of 15 outside-market valuation studies done in Central America and the Caribbean. The majority of them use the contingent valuation method to determine the good will for payment of fresh water or protected areas. Findings show that these suffer from: lack of details in farm and contingent scenario information; limited population samples. One possible cultural and strategic compromise associated with the surveyed local residents exists. The two valuations that were done using the hedonic valuation method suffer from the existence of neighboring marketing segments and the inability to obtain trustworthy values. Based on these experiences, methods and strategies have been proposed to improve this type of valuation for regional countries.

It has been frequently argued that an important attribute of production scheme diversification and sustainability as well as of agroforestry is its contribution to risk reduction for the farmer. This is achieved by reducing income variation. It is for this reason that knowledge of its behavior through time is essential to analyze the different situations that can present themselves. Therefore an analysis has been done to determine the behavior of cocoa and plantain prices as well as those of for salmwood, and products from the important area production systems. It has been found that for farmers, the predictions made using the models show a progressive decline over time such that for the product, the tendency is inverse, which is to say, toward a progressive increase. It was found that the combination in the agroforestry systems of cacao-plantain-salmwood presented advantages from the economic sustainability point of view. Currently, work is being done on the simulation of coffee prices to analyze the agroforestry systems that include this important product.

The following are abstracts from some of the specific research projects carried out during the 1997-1998 period in this research line.

- Analysis of the reforestation incentive programs implemented in Costa Rica

Incentives to promote reforestation in Costa Rica have operated since 1979, with an investment of 156 million dollars and the establishment of 152 thousand plantation hectares. In this sense, the forest policy intended to promote forest plantations, has reached its objectives with low efficiency and efficacy. This was mainly due to: incomplete implementation, lack of supervision and follow-up of the programs, operational difficulties, and lack of transfer of information of the forest research to producers. On the other hand, the financial and economic analysis of the plantations of *Gmelina arborea, Tectona grandis* and *Bombacopsis quinatum* demonstrate that the amount of the incentives represents a higher social cost than the benefits generated by carbon storage.

- Lateral root extension control of fast-growing timber species using grasses as biological barriers

Five gramineas species were investigated as potential biological barriers to reduce the radical competition in agroforestry associations with fast growing timber trees such as: *Eucalyptus deglupta* and *Cordia alliodora*. The roots of six-month-old *C. alliodora* saplings grew toward the side against the barriers while the *E. deglupta*, although it showed different types of interaction, generally crossed the barrier. Growth of both species of tree in association with the gramineas was lower than in the control group. It is probable that the barrier effect of the gramineas would be improved through establishing several rows instead of one or by reducing the planting distance between each row.

- Quantification of carbon stored in a silvopastoral system in Costa Rica's Atlantic zone

Silvopastoral systems are considered potential carbon (C) sinks which might help to mitigate the effects of increasing global C emissions. In a case study in the Atlantic Zone of Costa Rica, a medium-low fertile Typical Tropofluvent soil stored 233 t C ha^{-1} in the upper 50 cm under pure green Panic pasture (*Panicum maximum* Jacq.). In association with three different growth stages of natural regeneration of salmwood (*Cordia alliodora* Ruiz&Pav.) Oken; <3, 3-7, >7 years), the soil was less fertile but stored similar amounts of between 180-200 t C ha^{-1}. C concentrations decreased with soil depth and distance from the tree. Variability of C distribution increased with soil depth and age of the stand.

- The Balance of Carbon and Its Economic Value in the Suhumid Seasonal Forests of Santa Cruz, Bolivia

The carbon content and time-dependent carbon balance functions of a sub-humid forest at Lomerio, Santa Cruz, Bolivia (21 000 Has.) are estimated under two different management scenarios: no logging (protection) and low-impact logging. Five methods were used to estimate the value of the carbon sequestered: 1) mean international market value, 2) market value paid in Bolivia, 3) mean hectare cost when the forest is under conservation, 4) opportunity cost for timber not harvested, and 5) combination of the criteria 3 and 4. The biomass expansion factor for the 12 species studied varied between 1.20 and 3.33 with a mean value of 2.4. This is higher than values reported for tropical forests in general, but in the range of values reported for open forests. The mean carbon content of the 12 species studied was 43%. The economic carbon balance of the forest was simulated for a period of 35 years. The mean car-

bon pool of the forest was 1.5 Tg C, and the mean per hectare carbon pool was 68 Mg C. The economic returns from forest management at Lomerio increased considerably when the value of the carbon sequestered was taken into account.

Table 12. Average biomass accumulation (miligrams/ha), stored (miligrams C/ha) and fixed (miligrams C/ha/year) carbon in forest ecosystems and their values

Forest Ecosystem	Average rate of fixation (miligrams C/ha/year) (a)	Average biomass per hectare (miligrams/ha) (b)	Carbon stored (miligrams C/ha) (c)=(b)*0.45	Value of miligrams C = $US10 Costa Rican negotiation price) d=(c)*10	Value in terms of CO2 mitigation ($154US/ miligramsC/ha); e=(a)*154
Primary forest Control farms (Costa Rica)	0.83	117.6	67.9	679	127.8
Altered primary forest, Canopy Protector (Costa Rica)	0.21	121.3	54.5	540.5	32.34
Altered primary forest from Lomerio (Bolivia)	1.04	153.6	69.1	690	160.16
Secondary forest (Costa Rica)	2.5	150	52	520	385
Plantations (Chile)	2.8	144.5	65	650	431.2
Plantations (Costa Rica)	4	..	..	..	616

Source: data taken from case studies carried out through CATIE's Economics area.

- The Application of Multiple Choice Experiments in the Payment Distribution for Environmental Services in Costa Rica's Forests

This paper presents survey results from the initial stages of a choice experiment applied to Costa Rican Fuel Tax Payment Allocation among four different services provided by protected, managed and planted forests. The services evaluated were biodiversity, using protection of endangered and endemic species as an indicator; carbon sink services using both storage and net carbon fixation; water protection, using proximity to streams as an indicator; and scenic beauty using the presence of gaudy species as an indicator.

- Economic evaluation of the carbon sink services provided by several different forest ecosystems

The way carbon sink services of forest ecosystems are perceived is an important issue in the political agenda of Climate Change. Even more, when the relationship between carbon stock and flux is not absolutely clear in terms of climate change, mitigation problems and economic value. This paper summarizes results from CATIE's economic research related to environmental services provided by forests in carbon sequestration. The objective of this study is to show the economic value of carbon sinks and reservoirs in different forest ecosystems and to compare the results in terms of economic benefits.

3. Outreach Program

During 1997-1998, great progress was made in strengthening the Program and conceptualizing its principals and areas of action. To do this a series of activities were held with the purpose of contributing to the effectiveness and efficiency of the national research and transfer programs, providing support and improved technologies in the fields of sustainable agriculture and natural resource management in Tropical America through training, information dissemination, and technical assistance. These efforts should also harness the support of CATIE's stakeholders and their constituencies.

The Program is comprised of the Technical Cooperation and Marketing Area, the Training and Conferences area and the Information Services Area.

The Program's actions are carried out mainly with the support and cooperation of personnel from different technical areas in CATIE. The program facilitates the activities of these areas in the countries and serves as a nexus to identify and satisfy national service demands.

Within this perspective, the Program visualizes itself as a facilitator for the dissemination of information and the training of human resources; a platform for the development of research and development projects and networks for these projects in Central America; and a promoter of CATIE among its associates and donors.

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

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

These objectives are sought through four main Outreach Lines:

- Line 1. Promotion, Cooperation and Technical Assistance
- Line 2. Participatory Validation, Demonstration and Transference of Management Practices
- Line 3. Continuous Education through Training and Conferences
- Line 4. Information Management and Dissemination

The following is a detailed description of each of these lines and the activities carried out during the 1997-1998 period.

a. Outreach Line 1. Promotion, Cooperation and Technical Assistance

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

The following describes the progress made in this line in the period from 1997-1998.

- National Advisory Councils (CAN) groups are up and running in El Salvador, Guatemala, Honduras, and Nicaragua. The El Salvador CAN was established and began operating in 1997. Two more were added in 1998: Costa Rica and Honduras. The National Advisory Councils play an important role in orienting CATIE's activities so that they might adequately respond to the needs of the member countries and seek institutional opportunities.
- The National Technical Offices (OTN's) are running efficiently in El Salvador, Guatemala, Honduras and Nicaragua and Costa Rica. The Panama Office had difficulties supporting itself and has been temporarily closed. The technical office in Guatemala, with self-generated funds has purchased office space in Guatemala City and is the most active in administering projects for the national institutions.
- The work of the OTN's is organized to follow 11 specific objectives tied to the principal objectives outlined as part of their work. They are:

    - To market CATIE's products and services
    - To cultivate positive relations and good will
    - To maintain strategic watch
    - To obtain funding
    - To develop institutional ties
    - To promote inter-institutional cooperation mechanisms
    - To support and coordinate CATIE's national activities
    - To administer and implement projects
    - To provide a reference service
    - To offer technical assistance
    - To administer the Office

- For each one of these objectives the specific products that should be obtained and that will serve as the basis for monitoring their accomplishment were defined.
- In accordance with the framework outlined by the Institutional Directors, there has been an effort made to tighten relations between IICA and CATIE personnel in order to coordinate activities of mutual importance. Two meetings have been held to further this action ("Dialogo en el umbral" I and II). Details of viable joint activities were nailed down as a start to what is hoped will become a long term, far-reaching process. The process shows great potential.

- As a consequence of the destruction wreaked by Hurricane Mitch, in November, 1998, an internal meeting was held with the participation of the Program Directors, the Area Heads, CATIE's Technical Coordinators in the countries, and regional project leaders. The purpose was to identify the magnitude of the damage and design an institutional strategy to estimate the environmental impact in close cooperation with the governments of Honduras, Nicaragua, El Salvador and Guatemala.

- A dozen projects were written which have since become part of the Honduran National Plan for Reconstruction. In particular, project outlines were drafted to guide management plans for the most important watershed areas.

- CATIE';s National Technical Office in Honduras offered its services to the Secretariat of Agriculture and Livestock.

- Various shipments of medicines and medical supplies were sent to the Ministry of Health.

- Trucks with food and clothes were sent to the Honduran Embassy in Costa Rica. CATIE also loaned a pick-up truck and a large truck to the Embassy for three days to help them with the logistics of transporting these goods.

- CATIE vehicles and drivers were made available to the Ministries of Agriculture and Livestock.

- CATIE officials met in Tegucigalpa with members of the government and personnel from research institutes, NGO's, universities, farmers' federations, municipalities, and projects to discuss plans of action.

- At the government's request, CATIE initiated cooperation efforts with CURLA, ESNACIFOR, Fundación Vida and FENAGH.

- A series of meetings with regional and national institutes of the affected countries were organized in order to contribute with a technical vision toward the rehabilitation, reconstruction process.

An inventory of the networks in which the various CATIE technical areas participated was made, with the end of following-up their activities and main achievements. The directory of these networks was made available through the CATIE web site (see Appendix I). The objectives, members and activities developed by each Network are shown, as well as the level of CATIE's participation. It is expected that starting in 1998, the Center representatives in each Network will submit a trimester report to update and disseminate information. The main networks in which CATIE currently participates are:

- The Mesoamerican Plant Genetic Resource Network (REMERFI)
- The Regional Network of Cooperation in Education, Animal Husbandry and Natural Resource Research (REDCA)
- Central American Forestry and Agroforestry Information Network (RIBRENAC)
- The Mesoamerican Forest Seed Network (REMSEFOR)
- The Iberoamerican Pharmaceutical Plant Product Network (RIPROFITO)
- The Integrated Pest Management Network (MIP)

- The Regional Cooperative Program for the Technological Development and Modernization of Coffee Cultivation (PROMECAFE)
- The Plant Biotechnology Technical Cooperation Network (REDBIO)
- The National Commission of Forestry and Agroforestry Research and Extension (CONIEFA)
- Agroforestry Systems Network

b. Outreach Line 2. Participatory Validation, Demonstration and Transference of Management Practices

This line aims to validate, demonstrate, improve and disseminate management practices which may contribute toward sustainable development in the areas of agriculture and natural resources management, through participatory processes. Promotion, coordination and monitoring of validation and development projects, local knowledge gathering and testing, enhancement of feedback mechanisms, and regional networking for validation and development purposes are main elements of this Line.

The following outlines the progress made in this line during the period from 1997-1998.

Projects:

PROSEFOR

The Danish Agency for International Development (DANIDA) finances the Forest Seeds Project (PROSEFOR). PROSEFOR began Phase I of its activities in October 1992. This phase ended in December 1997. A new, three-year phase (Phase II) was approved and began in July, 1998. The Project is carried out in Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama and the Dominican Republic. On completing the first stage, the objectives stipulated by the project had been achieved.

The main objective of PROSEFOR is to strengthen forest development in the seven countries, assuring the availability of seeds with high genetic and physiological quality in the priority species.

The specific objectives are to back-up the establishment of seed sources, improve the running of national seed banks, personnel production training, seed collection and processing, in conjunction with a regional network of producers and consumers of forest seeds.

PROSEFOR has promoted the formation of National Networks of Producers and Consumers of forest seeds in Guatemala, El Salvador and Nicaragua. In the Dominican Republic and Costa Rica Support Groups for Forestry Professionals have been formed.

The objectives of these groups are to foster the production of forest seeds with better genetic and physiological quality and to promote their use on a national level. These groups meet several times per year to analyze progress and promote activities. PROSEFOR provides technical assistance and support for these meetings. The members of these groups are represen-

tatives of the governmental and non-governmental institutions that are related to the forestry sector.

The seven countries have seed sources selected for the majority of priority species. Some of these sources are technically managed and the rest are planning the implementation strategies for an improved management process. The seed banks, supported by the project, improved their operative system and are now providing better service to their users. The Regional Forest Seed Network (REMSEFOR) began operating in 1997.

The following are some of the most important achievements made by the project in the 1997-1998 period:

- Two training events were carried out in El Salvador, 2 in Nicaragua and 2 in Costa Rica in which more than 95 professionals in seed source management, collection and seed management. In addition, with the purpose of strengthening relations with national institutions and ensuring their support and follow-up of planned activities, more than 50 technical assistance visits were made. National Tree Seed Producers Networks, Technical Groups and the Regional Forest Seed Network (REMSEFOR) continue to be given support.
- With the support of the Forest Seed Project in the seven member countries more than 310 seed sources of priority species have been selected. Some have already been technically managed and are being used to satisfy part of the national seed demand. The rest are in the process of being managed.
- Depending on their facilities, the countries' seed banks have improved their operating systems and are providing better services to their clients.
- In the different forest seed production, collection and processing activities, 176 technicians were trained in the seven member countries.
- The Regional Forest Seed Network (REMSEFOR) was created and consolidated.

OLAFO

The Conservation for Sustainable Development in Central America Project, OLAFO, began its activities in 1989. It seeks to design development models, in conjunction with the local communities, based on the improvement of production systems, while taking advantage of the native tropical biodiversity. Financial support is provided at present by the Danish Agency DANIDA. In the past, SIDA and NORAD have also contributed to this effort.

It is hoped that these experiences will be replicated in other Central American communities. With this objective in mind, demonstrative areas have been established in Guatemala, Nicaragua, Costa Rica and Panama, as well as application areas in Guatemala and Honduras, all in agricultural frontier zones that are marked by active processes of deforestation in varied ecosystems.

In the 1997-1998 period, the main accomplishments of the project centered on defining and initiating transfer activities to the counterpart institutions in the countries with which direct working relations had been established (e.g. Centro Maya/MAGA and CONAP in Guatemala, COATLAH and AFE-COHDEFOR in Honduras and PNDR, MARENA/DEMAC adn MEDEPESCA in Nicaragua), developing research and validation activities and socioeconomic studies in a cooperative fashion. This implied an important number of activities directed at defining, ratifying and initiating the fulfillment of commitments on the part of those institutions.

The main results of the project focus on the methodologies generated and the experiences gained in their design and implementation in the demonstrative areas in the rural communities. They include:

- Experience was gained and methodologies were developed for the sustainable management of non-timber forest resources (ornamental and medicinal plants, natural insecticides and fibers for craftwork). Communities and individuals were targeted.
- High level authorities in from the national ministries were involved with project activities: in the community concessions (Peten, Guatemala); in work with the municipalities on a national plane (Honduras; and in regulation strategies (Nicaragua).
- The 28 de Julio Cooperative in Nicaragua became the first group to implement a forest management plan in mangroves.
- A rural based development model for natural ecosystem management was disseminated through the training of technicians from national institutions.
- Community development efforts in Guatemala were quite successful (legalization of groups, skills development and management and conflict resolution training) consolidating these groups around natural resources management . There was a high level of adoption of the productive alternatives for biodiversity management and use (fibers for handicraftwork, bee-keeping, and community forest harvesting in San Miguel de Peten). It should also be pointed out that new regulatory instruments for natural resources management such as the Community Concessions in Peten and the incorporation of lines of work on non-timber resources within some national institutions have been developed.
- Through the forest certification evaluation, the Community Concessions in San Miguel and La Pasadita, Guatemala qualified as organizations with good forest management procedures. The evaluation was performed by Smartwood (supported by the CATIE/CONAP project).
- In Honduras, community development efforts (legalization of groups, skill development, management and conflict resolution training) were successful. Management and biodiversity use alternatives (fibers for craftwork, bee-keeping) had a high level of adoption in these groups.
- Some national institutions incorporated lines of work on non-timber resources.
- Documents were donated to several Libraries (mainly theses).
- Field trips were made with farmers from the Demonstrative Areas.
- Workshops, courses and field trips were organized with the wide participation of personnel from national institutions and local community members.
- A series of events was organized in specific communities with positive impacts. For example, agroforestry technical assistance was offered to the Community of San Ramon de Jutapa, Honduras. Participatory sessions were held to characterize the micro-watershed area and to give instruction on the goat and forage tree modules. Field trips were taken around Peten.

Olafo finalized its activities in December 1997 but January - June, 1998 marked a bridge phase. The Project's results have been so important and innovative that the donors opted to continue the activities for two more years, starting in July 1998, in Guatemala, three in Honduras and one in Nicaragua. The project staff and lines of work staff were incorporated into the permanent CATIE structure (Phasing in). The goal is to strengthen the countries' self-governing skills so that they can take on the responsibility for the process when the Project concludes.

MANGLARES

The Adequate Use of Mangrove Resources in Estero Real (Nicaragua) and Terraba-Sierpe (Costa Rica) Project (MANGLARES) began its activities in 1992 and its activities continued until 1997 in Nicaragua. MANGLARES sought to design development models, in conjunction with the local communities, based on the improvement of the production systems. These incorporated the harvesting of native tropical biodiversity. In addition it is hoped that the experiences generated will be replicated in other Central American communities. For this reason the established demonstrative areas in Nicaragua and Costa Rica in mangrove forests located in the agricultural frontier suffering active deforestation. In addition, direct work relations were established with national institutions (PNDR in Nicaragua) developing research and validation studies and socioeconomic studies. The project is financed by the Danish International Cooperation Agency DANIDA.

The main results of the project focused on the methodologies generated and the experiences gained in the design and implementation of demonstrative areas within the rural communities. These include the design for the plan of community mangrove forest harvesting, methodologies for participatory regulating of mangrove forests and a Geographic Information System for the sustainable management of the Estero Real resources.

- Community development efforts were successful in Nicaragua, consolidating several groups around the management of natural resources. Adoption levels of productive alternatives for the management and use of biodiversity were high (fibers for craftwork, bee-keeping, community mangrove forest management). It should also be stressed that the new tools for natural resource management such as the Mangroves Forest Concessions are in the approval process.
- MANGLARES made a significant contribution to the development of human resources and technical cooperation in Nicaragua:
- The project donated documents to various Libraries (mainly graduate student theses)
- Field trips were made with Demonstrative Area farmers
- Nearly 1,800 people participated in training events and conferences on topics concerning the environment or mangrove management organized by the Project and/or in collaboration with CATIE Headquarters.
- Community organization as well as forest harvesting experiences was systematized.

The Project finalized its activities in December 1997 but the results have been so important and innovative that there is motivation to continue its activities for two more years in Nicaragua. The goal is to strengthen the countries' self-governing skills so that they can take on the responsibility for the process when the Project pulls out. The national MANGLARES team in Nicaragua was strengthened by the process, which allowed for a broad decentralization of the decision-making and initiative process. This bodes well for the process's potential after "phasing-out."

TRANSFORMA

The Technology Transfer and Professional Training in Natural Forest Management Project, financed by the Swiss Cooperation Agency COSUDE, has the objective of sharing knowledge and training qualified personnel in the design and implementation of natural forest sustain-

able management systems in Central America. In Honduras, it works on the north coast and on "the Mosquito Coast"; in Nicaragua it is based in the Autonomous Regions of the Atlantic zone and Rio San Juan. Agreements have been sought with national institutions to assure the Project's operation: COHDEFOR in Honduras (provides 2 technicians) and in the case of Nicaragua, an agreement with MARENA is in process.

This is a support project in such that it serves other projects, institutions and organizations. Its activities require the help of organizations to connect these various bodies. For this reason, Honduras formed the Honduran Humid Latifoliate Forest Management Network, REMBLAH, a lateral cooperation network formed by 4 institutions: COHDEFOR, COATLAH, CURLA and ESNACIFOR; and various Projects: PROINEL, MOPAWI/Mocoron/WWF, COSPE, and CUPROFOR, among others.

In 1997 the network statutes were established as well as its work areas. A series of training activities were organized:

- A Demonstrative Area was established in the CURLA Forest.
- A Forest Inventory Course was give to technicians
- A Data Base Management Course was offered to analyze the data gathered from the Demonstrative Areas and the Permanent Plots.
- Courses were offered on the management and use of chain saws, tropical dendrology, strategic planning, and community forest business administration, among others.

In Nicaragua, The REMARIO and REMAB-RAAN Networks were created. These are lateral cooperation networks organized as follows:

- REMARIO: 11 national institutions and permanent NGO's (Local Government Office of the Municipio del Castillo, DOCUMENTA, Fundacion del Rio, GME, INRA, INTA, INTECFOR, MARENA, MED, MAG, UNA/ECFOR) and a series of current Projects (ASDE-VERDE, ASODELDO/ACRA, PROCODEFOR, PROSUR, among others).
- REMAB-RAAN: 8 national institutions and permanent NGO's (Local Government Office of the Municipio de Puerto Cabezas, ADFOREST/MARENA, AFONIC-Bitwil, CIUM-BICU, FADCANIC-MUSAWAS, MARENA-RAAN, RAAN Natural Resources Secretary, URACCAN) and a series of external projects and organizations (DANIDA, IDSIM, MARENA/ASDI, SOLCARSA, WWR-Mikupia among others).

In addition, a series of activities to train Nicaraguan people was organized including courses, workshops, and extension activities.

The following are some of the most important achievements made by the project in the 1997-1998 period:

- A Demonstration Area was established in the Center for Research and Training on Tropical Forest Management, La Lupe de la UCA in Rio San Juan, Nicaragua.
- Progress was made designating an Operational Management Area in the Rio San Juan zone, possibly in conjunction with the Fundacion del Rio in the El Diamante community.
- Training courses were offered focusing on gender, technical writing and drafting management plans. Planning workshops were given. In total, there were five events organized in Nicaragua in 1997 with a total of 107 participants. Technical talks were given in

URACCAN directed at forestry educators. Approximately 70 individuals participated.

- Meetings were held with the three networks every two months. The networks organized forums on the problems involving forest resources in both regions with a total participation of 180 people.
- The Toncontin AMO (operative management area) camp was constructed in the Demonstrative Area near La Ceiba, Honduras. It was inaugurated October 6, 1998. An improved harvesting model, which included points on directed logging and the use of chainsaws for wood processing, was tested and validated at this AMO with community participation.
- A letter of understanding was signed with the business, "Maderas y Derivados de Nicaragua S.A." (MADENSA) to cooperate with the company and with the Indigenous Community Awas Tingni (Mayagna/Sumo) in establishing an AMO in an industrial concession with 42,000 ha in the RAAN, Nicaragua.
- A workshop was given with the Indigenous Federation from the Mocoron and Segovia zone (FINZMOS) to reorient the work carried out in Mosquitia (the Mosquito Coast).
- In 1997, 18 training events including workshops and courses were given in Honduras. In addition, technical talks were organized for the CURLA forest education staff (70 individuals) and a discussion was facilitated on illegal logging on the north Atlantic coast of Honduras and profit contracts.
- In 1998, a total of 19 training, promotion and outreach events were carried out for technicians, forest laborers, direct beneficiaries, and the civic society. 656 individuals from the three networks participated (REMBLAH, REMARIO, REMAB-RAAN).
- The first teacher exchange from 8 forestry and technical schools in the Americas was carried out.
- Support was given to CATIE graduate student masters thesis research.
- Support was offered to INTECFOR for a two-week fieldtrip with the students.
- Two documentation centers have begun preliminary work in Honduras and three in Nicaragua and in the ESNACIFOR library.

CATIE-CONAP:

The CATIE-CONAP Project is a collaborative effort provided by CATIE to the Guatemalan National Council on Protected Areas (CONAP) with the end of consolidating the Forestry Concessions System in the Multi-use Zone (ZUM) of the Mayan Biosphere Reserve.

This is a project that operates through specific products with funds from the Mayan Biosphere Project (which is overseen by USAID). The first phase of the project ended in 1996 and in January of 1997 the two-year second phase began. This phase solidly established a functional administrative structure that adheres to the Forestry Concessions System and helps to solve the technical and financial problems faced by the System. During this phase a permanent mechanism was developed for CONAP's technical assessment, to give the System continuity once the project has ended. During this phase the project carried out 17 specific products within the following Areas: Administration, Finance, Technical Aspects, and Assessment.

During 1997 and 1998, promising results were achieved; among them the following are noteworthy:

- The consolidation of the CONAP Monitoring and Evaluation Center (CEMEC), which has

a modern Geographic Information System and a current data base with information about the Mayan Biosphere Reserve.

- The training of technical personnel from CONAP to monitor the activities which comprise the judgment process and operation of the Forestry Concessions (7 events with an average of 25 participants).
- The drafting of a Strategy for the Management and Administration of the ZUM implemented in 1998.
- The coordination of forest products offered by the concession communities. This resulted in a substantial increase in the sale price of wood. In addition, contacts were made to start the forest certification process in 1998.
- Two more technical documents were published from the Mayan Biosphere Reserve Forest Management Collection, and two others from the same collection were sent in for review.
- CONAP drafted and approved a more easily managed set of standards for granting Management Units under the legal title of Mayan Biosphere Management and Use Concession.
- Acceptance of new community groups to participate in the forest concessions program in the Mayan Biosphere Reserve.
- A Geographic Information System (GIS) was structured and put into action in. Peten to facilitate Concession Program development and other control and monitoring activities in the region. The GIS system was extremely useful in combating the forest fires that devastated Peten in 1998.
- More than 100 people, comprised of staff members from CONAP/Peten (technicians and park guards) as well as personnel from institutions involved in the concession process, have participated in technical training courses.
- Thanks to the support in the marketing and commercialization process, a community group was able to harvest, process (through community industry), and export their wood products on international markets. This substantially increased the community income.
- International recognition for the work done through the forest certification process or "Green Labels" for good forest management in the concessions.
- The following technical documents were prepared:
    - Diagnostic Sampling
    - Methodology for financial analysis of the forest concessions in the Mayan Biosphere Reserve in Guatemala.
    - Manual for Permanent Plots in the Mayan Biosphere Reserve in Guatemala.
- As an exit strategy, the Project helped form and strengthened the local NGO "Fundación Naturaleza para la Vida".(Nature for Life Foundation

CATIE/INTA-IPM

The Integrated Pest Management Project, CATIE/INTA-IPM is sponsored by NORAD and has been in operation in Nicaragua since 1995. The Project's objective is to increase the communities' abilities to generate, modify and utilize pest management technologies that are more environmentally, economically and socially appropriate. Its target is agronomists, technicians, teachers, and small and medium-scale farmers in Nicaragua. Research, technological transfer, participatory research and development and the strengthening of local communities are combined through the promotion of local organizations. All activities have a gender focus. The second phase of the project ended in mid-1998 and a third phase was approved for five-years (1998-2003). This new phase will incorporate agroforestry elements and will have a regional scope.

This project has had national coverage in Nicaragua and its efforts are carried out through a large number of duly identified groups, committees and mechanisms.

Its impact in the country has been very successful owing to the great diffusion of information that has been gathered and the excellent results the technologies have had on many different crops. The main reason for these positive results is the participatory work method employed.

The Project has created inter-institutional work groups on various topics, which have become excellent mechanisms to legitimize and disseminate the experiences gained and technical recommendations generated by the Project through its various collaborative research mechanisms. These groups serve as a forum for discussion to decide on work priorities in the various areas, as well as a means to combine efforts in the organization of national and international activities and events. Groups have been formed for Coffee, Horticultural Systems, Gender, Plant Pathology, and Microbial Control and soon in *Musaceas*.

Strong ties have been established with a variety of institutions, local authorities and community organizations. UNA-Managua and UNAN-Leon, have re-acquired some of the facilities created by the Project such as the entomopathogen fungus sub-project, in such a way that they have made successful steps in improving IPM research and technical assistance capabilities. INTA, UNICAFE, MAG, REDCAHOR, ASONIFI and ANIFODA, among others, are essential partners in this effort.

The following are some of the most important achievements made by the project in the 1997-1998 period:

- During the 1997-1998 period, this project began the massive multiplication of the experiences and methods that had been developed in the project's first phased (1989-1994).
- Among the impact indicators that can be listed are the 93 training events held in 1997. Among the 2,846 participants, 75% were men. They included technicians and small and medium-scale coffee, tomato, cabbage, banana and basic grain farmers. These events consisted of MIP workshops given according to crop as well as conferences, technical visits, field practices, and service training. Some of these events were also presented in Costa Rica and Guatemala, and many of the Project's technical findings were presented in international conferences carried out in this period.

- From January - July, 1998, the last six months of the second phase, the work was organized into different activities oriented at systemizing the experiences and increasing the sustainability of the project progress. 52 training and evaluation events were carried out with the participation of 1260 men and 391 women from different institutions. The project specialists joined forces with 51 national technicians and 250 farmers to carry out participatory research at 10 sites in Nicaragua, generating technologies and determining where there are gaps in knowledge in order to better plan future projects. With the purpose of strengthening the capacity of the specialists in the different institutions, 48 work sessions were conducted with 17 inter-institutional groups. One-hundred and fifty specialist and national decision-makers participated. To share the lessons learned in the current phase and incorporate these into future work perspectives, 54 bilateral and multilateral meetings were held with varying institutions. Phase II of the project ended in July, 1998.

- In addition to training, 78 participatory group meetings were held where project members met with a total of 102 technicians (23% women) and 404 farmers (24% women) in work groups that implement IPM in the field on various crops.
- In September the achievements and lessons learned in this phase (1995-1998) were presented to a group of national decision makers and the donors in closing event with short talks. The final report was presented.
- In August, 1998, NORAD approved the financing for a "Regional participatory implementation program for Integrated Pest Management and Agroforestry in Coffee in Nicaragua and Central America." The new program led by CATIE in coordination with several regional and national institutions will allow for work to continue, strengthening national capacities in the region during the period from 1998 to 2003 when the IPM and Coffee Agroforestry programs will become the responsibility of the rural families.

CATIE/FIAES

In 1997, Training and Information Management Project and Extension Activities directed at Forestry and Agroforestry Projects financed by FIAES were carried out in El Salvador. The activities were funded through an agreement between CATIE and FIAES. The objective was to strengthen the forestry and agroforestry activities developed by 20 NGO's that receive financing from FIAES to carry out environmental projects through the development of human resources.

The following are some of the most important achievements made by the project in the 1997-1998 period:

- In 1997, 20 training courses (5 different modules in 4 regions) on forestry and soil conservation, with a total of 457 participants (9% women).
- Courses on RIBRENAC and the MIRA system for the management of forestry information.
- Development of a database (SIMA) adapted to the NGO's beneficiaries' information needs: payrolls, nursery products, and reforestation and soil conservation data.
- In 1997, 177 participants (14% women) took four field trips and 2 field days to observe/evaluate soil conservation, agroforestry, watershed management, forest plantations and wildlife activities.
- Extension materials were produced.
- In El Salvador, technical assistance was offered to 20 NGO's with environmental projects funded by FIAES. Three field trips were taken with farmers: 42 men and 3 women.
- The Following materials were reproduced with the support of the NGO's: flipcharts on tree nurseries; establishing and managing tree plantations and agroforestry plantations; live fenceposts; soil conservation; tree seed collection and management.
- The Project was concluded with an excellent rating in Technical Administration and Execution.

c. Outreach Line 3. Continuous Education through Training and Conferences

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

The Training Area proves an invaluable tool of the Outreach Program. Thousands of farmers, technicians, educators, researchers and decision-makers in the region participate in CATIE's training activities annually, benefiting from the most up-to-date knowledge available in the field.

In 1998 an exhaustive evaluation was conducted on the strategic courses. Based on this, a work plan was approved by the Training Coordinators' Committee that adjusts and up-dates the current courses, canceling those that are no longer valid. A new training modality was started, using strategic alliances with national institutions, mainly through REDCA. One successful experience came through a series of courses contracted by INTA in Nicaragua. CATIE offered the courses in coordination with professionals from REDCA affiliated organizations, such as the National University, the State Distance University and the Central American Livestock School. These kinds of associations guarantee that CATIE can offer the best training in the field, and thereby fulfill the needs of the other national institutions.

The following describes the progress made in this area in the period from 1997-1998.

- The period from 1997-1998 was marked by strong efforts made to solidify the conception of the Program and the areas where efforts should be concentrated. This process bore fruit in the publication of a rough draft of the program strategy ("Outreach Program: Business Areas, Strategies and Proposals for Program Development"), which summarizes and systemizes the conclusions of these efforts.
- There were many important changes made during this period in the internal structure of the program. The Training Program was separated from Education and including in the Outreach Program. Through this action, the spectrum of activities embarked upon by the Program increased beyond measure.
- In addition, the process to decentralize CATIE's activities was reinforced in such a way that a much higher percentage of the Program and Center activities were carried out in the member countries as opposed to at CATIE headquarters in Turrialba. The data mentioned for Training and Technical Assistance supports that statement.

The following figures illustrate the training activities undertaken in 1997 and 1998:

- In 1997 - 421 events were carried out with 8918 participants.
  In 1998 - 246 events were carried out with 5429 participants.
- Of these events, in 1997, 96 took place at CATIE (1,266 participants) and 325 in the member countries (7,652 participants).
  In 1998 50 took place at CATIE (892 participants), and 670 in member countries (4,278 participants).
- In 1997, 37% of the participants were women.
  In 1998 the percentage was 24%.
- In all the participation reached a total of 6,345 participation days in 1997 and a total of 1,099 in 1998.

The decentralization mentioned above is only part of a complex series of changes CATIE will have to strive with increasing tenacity to achieve and that will set the tone for its actions in the next biennium. Among these changes are the efforts made to up-date CATIE's connection with the world of information and its telematic infrastructure, in such a way that state of the art technology and resources can be made available in the near future.

Nevertheless, there are a series of sensitive issues that need to be confronted in order to be able to focus the Programs efforts well with the end of fulfilling the multiple expectations surrounding these and the lack of resources faced. These points have been summarized in the document, "Unresolved Strategic Issues: A summary of concerns."

The importance of CATIE's Training Area is illustrated in the following graphs and tables. These show the events offered in the member countries and at CATIE Headquarters (Table 15), distribution of training events according to event type (Chart 13), distribution of training events by country (Table 16) and by technical area (Table 17).

Table 13: Training events at CATIE and in member countries in 1997-1998.

A.*Place*	EVENTS (No.)	DURATION (days)	NUMBER OF PARTICIPANTS		
			Men	Women	Total
Member Countries	394	1372	6269	2457	8726
Turrialba	145	1318	1158	982	2140
Other Countries	19	62	465	176	641
TOTAL	558	2752	7892	3615	11,507

Chart 9 : Number of Training Event Participants According to Event Location 1997 - 1998

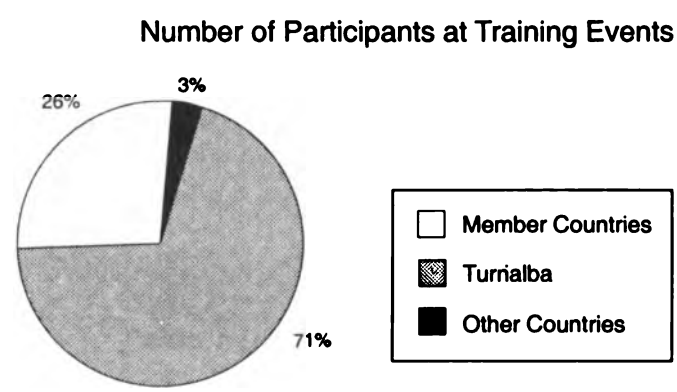


Chart 10: Number of Participants in Training Events According to Event Type 1997 - 1998

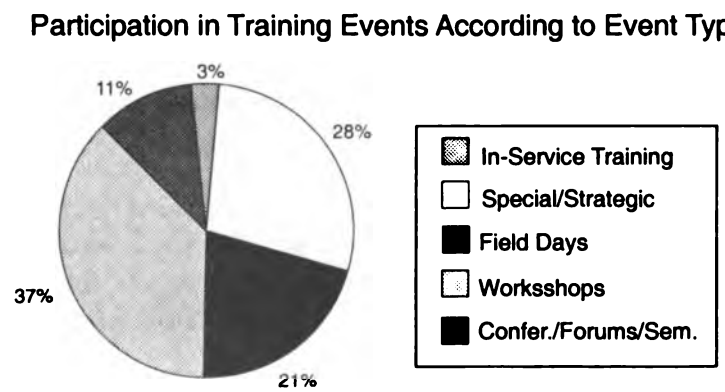


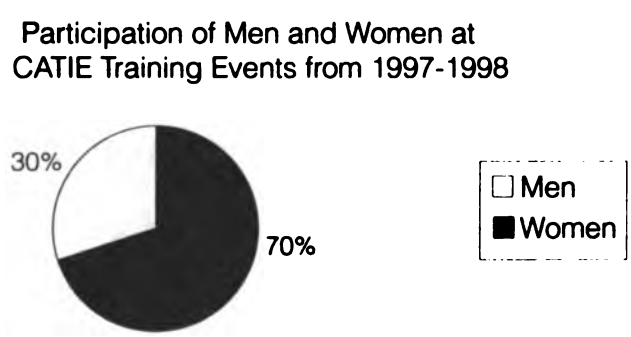
Table 14: Distribution of Training Events by Country 1997 – 1998

Place	Number of Events	Duration (days)	Participants		
			Men	Women	Total
Belize	8	121	47	23	70
Costa Rica	80	235	860	471	1331
El Salvador	25	55	455	207	662
Nicaragua	89	365	811	261	1072
Panama	49	163	1103	417	1520
Honduras	40	280	881	350	1231
Guatemala	90	127	1605	561	2166
Mexico	8	26	507	167	674
CATIE	145	1318	1158	982	2140
Other Countries	19	62	465	176	641
TOTAL	558	2752	7892	3615	11,507

Table 15. Training Events According to Technical Area and Participant Gender1997 - 1998.

Area or Unit	Number of Events	Duration (days)	Participants		
			Men	Women	Total
Agroforestry	181	735	2684	1456	4140
Protected Areas	26	472	316	98	414
Biotechnology	2	13	15	15	30
Information Services	40	273	752	194	946
Forestry	72	407	1212	385	1597
Plant Protection	99	355	2060	832	2892
Watershed Mgt.	16	222	255	57	312
Tropical Agriculture	1	3	20	6	26
Economics	19	97	220	116	336
Outreach	102	175	358	456	814
TOTAL	558	2752	7892	3615	11,507

Chart 11: Training Event Participation according to Gender, 1997-1998



d. Outreach Line 4. Information Management and Dissemination

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

What follows are the most outstanding achievements made during the period from 1997-1998 in this line.

- The Institutional Linkages Information System, ILIS, was developed. Important progress was made in the development of ILIS as a monitoring and reporting tool on who receives products and services from CATIE (type of client, geographical coverage, weather, services rendered, products distributed), as well as on the services that CATIE receives. ILIS is a series of related databases that can give information about organizations and people that are linked to CATIE. It contains a data bases on organizations, people and one for each type of link (training, conferences, graduate school, subscription and publications, documentation and library services, germplasm, technical assistance, visitors, projects, networks and others.)
- During 1997, important efforts were made in the field of telematic and teleconferences. The first steps were taken to bring CATIE up-to-date with global advances in educational support technology. This will include the Teleconference and Virtual Education facility. The plans for the new building were completed at the end of the year and the construction bidding process begun. The technologies and distributors required were also identified. In addition, the Board of Directors approved a budget of US$300,000.00 for this project. The first stone of the future building was laid. The internal fiber optic computer network was completed and an agreement made with RACSA-ICE to increase the Internet connectivity to 256 Kbps which came into effect in 1998.
- In 1998 the backbone of the CATIE network began working at 100 Mega bits per second (Ethernet technology) whereas before it functioned at only 10 Mbps.
- The Information Clearing House, initiated by the General Director was conceived as a service composed of four basic on-line components: the web page, the scientific information services, decision-maker support services, and an information bulletin for the scientific and technological community.
- The Information Services Unit attended an average of 12 inquiries daily in 1997. In 1998 the average was 15.

- 37 short courses on 5 different topics were offered internally to the CATIE community and were attended by 323 participants in 1997. In 1998 76 short courses were offered to 1518 participants.
- More than 18,000 inquiries in 1997 and 16,829 in 1998 were attended in person each year in the Orton Memorial Library. More than 3,000 more were attended by other methods. Eighty-three percent of those were made by students and members of the Institution's technical personnel. The remaining 17% were made by external users.
- Orton acquired 14,434 journals and 1,305 books by purchasing them or through donations.
- 970 new database entries were catalogued in 1997 and 2,869 in 1998 making a current total of 66,516 entries.
- On average 48,000 documents were consulted and 33,000 checked out in both 1997 and 1998. The databases were consulted 2,000 times in 1997 and 3,862 times in 1998.
- There were 10,200 accesses made to the Orton Web Page in 1998 alone.

- The first general catalogue of CATIE publications was produced and 2,000 subscriptions were made to the Center's Technical Journals (462 MIP, 974 RAFA, and 750 RFCA). A total of 21 Technical Publications with ISBN numbers was produced, and a total of 3,195 publications were distributed to 44 countries. In 1998 over 5,000 journals were distributed.
- The results of more than 10 years of research on forest plantation performance were consolidated and published. These data were made available to the public in 6 volumes, one for each Central American country.
- Through the CATIE-CIFOR agreement, the new multilanguage version for the Forestry Resources Information Management System (MIRA), was up-dated from its DOS version to a Windows format and was made available to users in its new English version translated from the original in Spanish in several countries.
- On average 1,500 visitors including university students from throughout the Americas and Europe, scientists, researchers technicians and tourists, came to the central Headquarters in Turrialba.
- 18 press releases were made through 15 different communications media.
- A total of 85 technical missions to the member countries were channeled through the Outreach Program in 1997 in 1998 this figure was 92.
- The Program participated in scientific fairs and exhibitions in national and international events. A set of portable storage cases was acquired to use in this type of presentation. All presentations were prepared in both English and Spanish.
- A set of information products on CATIE was created for public use and was widely distributed (to more than 3000 different recipients). They include: the institutional video, "Produce while Conserving and Conserve while Producing"; standard presentations on the Center with several different visual aids; the publications, "CATIE: Duties, Mission and fundamental Values," and "PANORAMA 96-97"; the bulletin, "CATIE News"; and, a series of newspaper articles on CATIE through the agreement with IPS. These were distributed to more than 40,000 NGO's.
- A complete set of souvenirs was designed as well as a series of items to be used for advertising or for institutional courtesy: pamphlets, posters, cards, and calendars. These were all widely distributed.
- CATIE currently publishes three journals: Agroforestería de la Américas (Agroforestry in the Americas), Revista Forestal Centroamericana (Central American Forestry Journal), and Revista de Manejo Integrado de Plagas (Integrated Pest Management Journal). A plan was drafted to integrate editing, publishing and marketing services of the three in order to lower production costs and achieve self-financing.

- The Spanish version of the new user-friendly CATIE Web Page was made available but there are still some connection problems. The English version is in the editing process.
- The first phase creating a data base with the people and institutions tied to CATIE was completed. The database is designed to make information about the institution's diverse activities readily available.
- Efforts were made to produce teaching materials in this period. The translation of Agroforestry technical manuals was financed by GTZ. A book on the invertebrate pests of Central American food crops was published in text and CD versions.
- At the request of the Natural Resources Department of the Swedish Cooperation Agency (SIDA), CATIE has committed to writing a regional report entitled, *Reducing the Vulnerability of Central America to Natural Disasters by Improving Agriculture and Natural Resources Management*. This technical report outlines the repercussions and priorities after the emergency. CATIE also prepared a brochure entitled, "CATIE's immediate post-

Hurricane Mitch Actions in Costa Rica," showing the institution's response to the crisis. Several meetings with other national and regional technical institutions have been held and technical workshops have been conducted in the countries most affected by the disaster. In consultation with CCAD, a technical report was produced and distributed in May, 1999 addressing the problems inherent in the agricultural and natural resource reconstruction and rehabilitation process. CATIE will also attend the May 1999 meeting for the reconstruction of Central America as part of the SICA delegation.

IV. CONCLUSIONS AND RECOMMENDATIONS

Significant steps were made to reorganize, prioritize, integrate and improve the efficiency in all of CATIE's technical and administrative areas but especially in the Higher Education, Research and Outreach activities. Although the nature of much of the research carried out at CATIE is such that impacts are only visible in the medium to long-term, there have already been quality improvements made and some indicators are showing steady progress.

The presence of CATIE's publications in the best scientific journals and in Proceedings of International Symposiums demonstrates that the results obtained are relevant, influential and of high interest to its clients in member countries and world-wide.

An ever-increasing number of applicants to the Graduate Program also illustrates CATIE's relevance and is an indicator of the increased interest in its education programs. In 1998, there were almost 400 applicants of whom nearly 250 fulfilled all of CATIE's requirements (including an entrance exam). Shortage of scholarship resources is the key factor limiting the number of students enrolled in the Masters and Doctoral Programs.

Consolidation of the Graduate School has reaped many positive results. The advent of the Doctoral Program has sponsored increased international interest in CATIE and promoted inter-institutional ties with American and European higher education centers.

At the end of the millenium, it can be said that the Center's financial situation and its perspectives are satisfactory. The effort made to consolidate this in the past few years has born fruit. The funds negotiated for future activities have been significant.

The Outreach Program activities are being fine-tuned steadily which is important as this program is one the chief means by which the Center responds to member country needs.

CATIE's presence in the member countries becomes more and more relevant, mainly because of the presence of the National Technical Offices and the National Advisory Councils and because the agenda is less focussed on projects and directed more toward responding to the national institutions' priorities.

The reorganization of the Research and Outreach Programs to reflect "Lines of action" has promoted a more streamlined approach to fulfilling the Institution's mission through a better and more efficient use of inter-Area technical resources.

The quality and the quantity of the Research done by the Center have improved. This is reflected in the quantity of publications and the great increase in the number of articles published in internationally recognized, refereed journals. There have been many more listings in the Science Citation Index.

V. APPENDICES

Appendix 1: Networks

During 1997, the Technical and Marketing Cooperation Area (ACTM) was assigned the task of creating an inventory of the networks in which the Center participated through the different technical areas. This was done with the end of following-up its activities and main achievements.

A directory was drafted of these networks, indicating the objectives, members and main activities developed in each, as well as the degree to which CATIE participated in them.

REMSEFOR: The Tree Seed Network of Central America and the Caribbean

Objective: Support and strengthen the continuous and timely storing of genetically and physiologically high-quality tree seeds to support regional forestry development.

Sponsor: PROSEFOR

Geographic coverage: Guatemala with the participation of representatives from El Salvador, Costa Rica, Nicaragua, Panama the Dominican Republic and Honduras.

Participation: CATIE participates actively in training and technological dissemination activities and contributes by periodically publishing an information bulletin and recently produced a document outlining the need for tree seed research in Central America and the Dominican Republic.

REMERFI: Mesoamerican Plant Genetics Resource Network

Objective: Promote the conservation, management and sustainable use of germplasm native to the Mesoamerican Region.

Sponsor: Inter-American Development Bank (IDB). Also, recently, GTZ (Germany).

Geographic coverage: Mexico, Central America and Panama

Participation: CATIE participated actively in training and technological dissemination activities.

REDCA: Regional Network for Cooperation in Animal Husbandry and Natural Resources Education and Research

Objectives: To promote lateral cooperation both nationally and regionally among institutions in the member countries with the goal of fostering sustainable development of animal husbandry and natural resources. To improve the quality of research, higher education, training and extension, in the fields of animal husbandry and natural resources, as necessary instruments to reach the goal of sustainable development.

Sponsor: Holland. Project: "Strengthening of Educational, Research and Development Institutions in CATIE's member countries." Funds approximately US$80,000.00/year.
CATIE Funds US$20,000.00/year in addition to the work put in by their executives and technicians.

Geographic coverage: Regional: Latin America. The following are member countries: Mexico, Belize, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guyana and the Dominican Republic.

Participation: CATIE is in charge of the network's Executive Secretariat and is responsible for its work.

Main activities in 1997:

- The Head of the Technical Cooperation and Marketing Area (ACTM) was in charge of the Executive Secretariat.
- Several work meetings were held to analyze proposals for different events and to define strategies for their implementation. The main activities undertaken in that period are summarized in Table 2.

Main activities in 1998:

- "Virtual Teaching Cycles" a workshop held in the Dominican Republic for national institutions with Spanish instructors. April 22-24.
- "An Alternative to Cattle: Agroforestry Focus" Regional event carried out in Mexico. September 23 - 25.
- "Animal Husbandry and Forestry Education and at the Secondary and University Levels" Regional event held in Guatemala. September 10-11.
- "Business Management for Livestock Farmers." Regional Event held in Panama. September 21-25.
- Other events workshops held in Venezuela, El Salvador and Nicaragua.

RIBRENAC: Central American Forestry and Agroforestry Information Network

Objectives: To facilitate access to regional forestry information.
Assure that forestry extensionists have access to technical information to disseminate to farmers.

Sponsor: Holland. Project: "Strengthening of Educational, Research and Development Institutions in CATIE's member countries." Funds approximately US$19,000.00 annually.
CATIE provided a part-time technician to do follow-up on the network activities.

Geographic coverage: Regional-Central America. The following are member countries: Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama.

Participation: CATIE is in charge of the Control Center (Orton Memorial Library) which coordinates and implements Network operation (technically, financially, and administratively).

Main activities in 1997 and 1998:

- Bibliographical searches for Network members.
- Photocopied material for Network members: a total of 14,532 photocopies.
- Numbers 9-10 and 11-12 (corresponding to Jan.-June. and July-Dec., 1997 respectively) of the Informative Bulletin RIBRENAC
- In addition, it collaborated in the publication of the Bibliography on Natural Latifoliate Forest Management in Tropical America, which was distributed to all the members of RIBRENAC.

- With the goal of strengthening the countries' existing databases in the areas of agriculture in the world arena, the CD AGROAMBIENTE developed by IICA-CABI was acquired for all the National RIBRENAC Control Centers.

REMBLAH: Latifoliate Forest Management Network, Honduras

Objectives: Foster cooperation between the actors involved in the management of moist latifoliate forests for the enrichment of the sector. They propose to do this by:
- Planning, performance, follow-up and participatory evaluation of the common processes in the generation of experiences.
- Supporting documentation activities, dissemination and interchange of experiences obtained by the members of the Network.

Sponsor: These institutions and member organizations fund the Network: COHDEFOR, PDBL, COATLAH, PROINEL, CURLA, WARP, ESNACIFOR, Mocoron/MOPAWI/WWF, COSPE, FUPNAPIB, Collective Societies, CATIE

Geographic coverage: Honduras

Participation: CATIE participates through the TRANSFORMA and OLAFO projects.

REMARIO: Rio San Juan Management and Conservation Network

Objectives: Disseminate information in a broad, participatory way, in order to strengthen information exchange and training as outlined in the Sustainable Development Strategy SI-A-PAZ, for the protection and conservation of latifoliate forests.

Sponsor: These institutions and member organizations fund the Network: Castillo Mayor's Office, ASODELCO/ACRA, Fundacion del Rio, ROCODEFOR, INRA, UNA, INTA, Escuela de Ciencias Forestales, MARENA/SI-A-PAZ, MADERAS, MEP, San Juan River Watershed Project, MAG, CATIE (TRANSFORMA)

Geographic coverage: Nicaragua

Participation: CATIE participates through the TRANSFORMA project.

REMAB-RAAN: Natural Forest Management Network for the Autonomous North Atlantic Region of Nicaragua

Objectives: Foster and coordinate technical cooperation and technological transfer efforts by means of training, dissemination, and technical assistance to promote integrated management of the natural latifoliate forests in the region.

Sponsor: The institutions, NGO's, businesses and projects that provide funding for this Network are: the Municipal Mayor's Office, DANIDA, ADFOREST/MARENA, IDSIM, AFONIC, MARENA/ASDI, FADCANIC, SOLCARSA, MARENA/RAAN, WWF/Mikupia, Secretariat for Natural Resources, RAAN, CATIE (TRANSFORMA), URACCAN

Geographic coverage: Nicaragua

Participation: CATIE participates through the TRANSFORMA project.

Mesoamerican and Caribbean Herbarium Network

Objectives: The network has the following purposes:

- To support the stability and solidity of regional herbariums
- Stimulate and foster botanical studies and the training of new researchers in the field of botany.
- Support education, related to basic and applied botany.
- Perform scientific and sociology studies in the region.
- Act as scientific and social information center (biodiversity, natural resources conservation, sustainable development, and environmental education).

Sponsor: The institutions, NGO's, businesses and projects that provide funding for this Network are: the Municipal Mayor's Office, DANIDA, ADFOREST/MARENA, IDSIM, AFONIC, MARENA/ASDI, FADCANIC, SOLCARSA, MARENA/RAAN, WWF/Mikupia, Secretariat for Natural Resources, RAAN, CATIE (TRANSFORMA), URACCAN

Geographic coverage: Nicaragua

Participation: CATIE participates through the Olafo project. The Olafo Project acts as an advisor and member of the Network. At the end of 1997 (November 17-20) it provided technical and financial support to the Third Network Meeting carried out in San Jose, Costa Rica.

BIODATA Network

Objectives: Facilitate the administration, generation and exchange of information in order to conserve, know, disseminate and use our biodiversity in a sustainable form.

Sponsor: INBio

Geographic coverage: Costa Rica

Participation: CATIE continues to be part of the Advisory Group for the Biodata Network and participates actively as one of its main members.

RIPROFITO: Iberoamerican Plant-based Pharmaceutical Products Network

Objectives: To promote lateral cooperation between the sectors involved, To facilitate the harvesting and conservation of native iberoamerican plants in order to benefit the public.

Sponsor: The CITED (Iberoamerican Science and Technology Development Program). This organization, in turn, receives funds from the national governments of various member countries and the Spanish government. The Network also carries out self-supporting projects.

Geographic coverage: Latin America and Spain. (CITED was started with Spanish funding).

Current activities: The Network develops training courses, workshops, meetings for technical exchange and coordination as well as research on the potential use of various Latin American plant species in medical science.

Participation: At the end of 1996, CATIE signed a cooperation agreement with CITED. They organized a medicinal plant course. CATIE contributed academic support.

IPM: Integrated Pest Management Network

Objectives: To strengthen the procedures and abilities to carry out field and laboratory diagnostics and identify pests which affect the principle regional crop plants.

Sponsor: United States Agency for International Development (USAID) through its ROCAP and RENARM programs.

Geographic coverage: Guatemala, El Salvador, Honduras, Costa Rica, and Panama.

Participation: CATIE is responsible for regional project coordination. This has had a definite influence in the Network's direction and historical development.

Current activities: Since 1991 the Network has made a direct attack on the problem of the region's "white fly."

PROMECAFE: Regional Cooperative Program for the Technological Development and Modernization of Coffee Culture

Objectives: To develop research and applications for new technologies, which contribute, to the modernization of regional coffee growing.

Sponsor: Inter American Institute for Agricultural Cooperation (IICA) as well as Coffee Institutes in the Network's member countries.

Geographic coverage: Mexico, El Salvador, Honduras, Nicaragua, Costa Rica, the Dominican Republic and Jamaica.

Participation: CATIE participates in the Coffee Genetic Improvement Project. Production work is done on elite materials through conventional improvements. In addition, a biotechnological component is involved that includes clonal micropropagation, large-scale multiplication, and behavior and mass diffusion trials to PROMECAFE member countries. CATIE's genetic germplasm resources are also evaluated through Molecular Biological techniques.

Current Activities: Nematology Research: Guatemala.
Plant pathology Research: Honduras and Nicaragua. Entomology Research: El Salvador.
Technology Transfer: El Salvador.
Training: Costa Rica, El Salvador, Guatemala, Honduras, Jamaica, Nicaragua, and the Dominican Republic.
Regional Technological Projects and Services.

REDBIO: Technical Cooperation on Vegetable Biotechnology Network

Objectives: To support national and international mechanisms for integration and cooperation including the formation of national and regional policies.
To promote the generation and exchange of technological knowledge and biological material.
To foster the development of cooperative projects within Regional laboratories and recognized research and higher education centers worldwide.

Sponsor: United Nations Food and Agriculture Organization (FAO)

Geographic coverage: Latin America and the Caribbean.

Participation: CATIE coordinates Central American activities through the Biotechnology Unit.

Current activities: Information was disseminated on activities in the field of Biotechnology in Latin America and the Caribbean. Training courses were promoted in member countries.

REDCAHOR:

REDCAHOR carried out its first regional workshop for trial planning (IDIAP/PANAMA) May 4-8, 1998. CATIE had an active role in the planning of the activities, programming the germplasm activities to be developed in the Network member countries.

The Plant Genetics Resources Unit donated 300 accessions of *Capsicum sp* (Pepper), 230 accessions of *Lycopersicom esculentum* (Tomato), and *Cucurbita moschata var* "Sello de oro" seeds to establish regional germplasm evaluation and selection trials in the REDCAHOR member countries.

Appendix 2: Graduate Program

Table 1. Applicants to the Master Program by Country and by gender

COUNTRY	1997			1998		
	M	F	Total	M	F	Total
Argentina	2	6	8	1	4	5
Belize	7	3	10	1	2	3
Bolivia	25	5	30	26	2	28
Brazil	11	8	19	11	13	24
Colombia	20	18	38	29	25	54
Costa Rica	22	3	25	24	10	34
Cuba	1	1	2	4	3	7
Chile	0	0	0	0	1	1
Ecuador	21	4	25	15	5	20
El Salvador	13	6	19	13	7	20
Emeritos Araber Unidos	0	0	0	1	0	1
España	2	1	3	1	1	2
Estados Unidos	0	1	1	0	1	1
Guatemala	18	1	19	20	2	22
Haití	3	0	3	1	0	1
Honduras	26	15	41	25	8	33
Mexico	26	10	36	24	9	33
Mozambique	0	1	1	0	1	1
Nicaragua	20	18	38	13	10	23
Panama	12	2	14	11	1	12
Paraguay	4	1	5	2	2	4
Peru	15	8	23	16	6	22
Dominican Republic	10	1	11	11	2	13
Uruguay	1	1	2	0	1	1
Venezuela	14	2	16	11	3	14
	TOTAL		**390**			**380**

Table 2. Applicants admitted to the Masters program by country and by gender

COUNTRY	1997			1998		
	M	F	Total	M	F	Total
Argentina	2	1	3	0	3	3
Belize	1	2	3	0	1	1
Bolivia	13	3	16	14	2	16
Brazil	6	6	12	4	7	11
Colombia	8	11	19	17	13	30
Costa Rica	16	3	19	19	6	25
Cuba	1	0	1	1	1	2
Chile	0	0	0	0	1	1
Ecuador	9	3	12	8	3	11
El Salvador	9	4	13	11	3	14
United Arab Emirates	0	0	0	1	0	1
Spain	1	1	2	1	1	2
United States	0	0	0	0	1	1
Guatemala	14	1	15	15	2	17
Haiti	1	0	1	1	0	1
Honduras	8	4	12	7	2	9
Jamaica	0	0	0	0	0	0
Mexico	14	6	20	14	4	18
Mozambique	0	0	0	0	1	1
Nicaragua	12	5	17	10	5	15
Panama	5	1	6	5	1	6
Paraguay	1	0	1	2	1	3
Peru	10	2	12	13	5	18
Dominican Republic	4	1	5	4	2	6
Uruguay	1	1	2	0	1	1
Venezuela	7	1	8	7	3	10
TOTAL			**199**			**223**

Table 3. Applicants to the Master's Program by area, 1997

AREA	APPLICANTS			ADMITTED			REGISTERED		
	M	F	TOTAL	M	F	TOTAL	M	F	TOTAL
Agroforestry and Watershed Mngt.	79	23	102	21	5	26	12	3	15
Ecological Agriculture	69	31	100	53	26	79	7	8	15
Forests and their biodiversity	68	31	99	46	19	65	7	5	12
Environmental Economics	36	23	59	20	4	24	8	5	13
Undecided	23	7	30	4	1	5	2	0	2
TOTAL	275	115	390	144	55	199	34	21	55

Table 4. Applicants to the Master's Program by Area, 1998

AREA	APPLICANTS			ADMITTED			REGISTERED		
	M	F	TOTAL	M	F	TOTAL	M	F	TOTAL
Agroforestry and Watershed Mngt.	61	20	81	42	15	57	2	4	6
Ecological Agriculture	68	26	94	27	16	43	6	3	9
Forests and their biodiversity	63	36	99	42	19	61	8	6	14
Environmental Economics	34	27	61	41	19	60	7	5	12
Undecided	30	15	45	2	0	2	0	0	0
TOTAL	256	124	**380**	154	69	**223**	23	18	**41**

Appendix 3: CATIE personnel participation in congresses and Workshops by Research Line 1997-1998.

Research line 1:

- BIOVEG'97, Ciego de Avila, Cuba, 2-5 April, 1997.
- 17th International Scientific Colloquium on Coffee, Nairobi (Kenya), 21-25 July, 1997.
- Impacto de la biotecnología vegetal en Costa Rica. San José, Costa Rica, 21-22 August, 1997.
- Recent advances in biotechnology for tree conservation and management. Florianopolis, Brazil, 15-19 September, 1997.
- XVIII Simposio Latinoamericano de Caficultura, San José, Costa Rica, 16-19 September 1997.
- International Conference on Big Leaf Mahogany, San Juan, Puerto Rico. October 22-24, 1996.

Research line 2:

- 5th Annual Progress Review of the 5-Year National Research and Action Plan for Development of Management and Control Methodology for Silverleaf Whitefly. San Diego, California. January, 1997.
- XVI Congreso Brasileño de Entomología. Salvador, Bahía, Brasil. March, 1997
- Taller Regional sobre Parasitología Forestal Tropical. Campeche, México. Abril, 1997.
- Taller sobre Técnicas para el Análisis Molecular de Patógenos de Plantas. San José, Costa Rica. July 3 and 4, 1997.
- VI Taller Latinoamericano y del Caribe sobre Moscas Blancas y Geminivirus. Santo Domingo, Dominican Republic. August, 1997
- IV Congreso Costarricense de Entomología. San José, Costa Rica. November, 1997.

Research line 3:

- ICRAF Fallow symposium, Malawi, March 7-18, 1997
- International Congress on Biological Nitrogen Fixation: The Global Challange and Future Needs. Bellagio, Italia. 8-12 April, 1997.
- Seminario Nacional sobre Agroforestería. San Francisco de Macoris, República Dominicana, 6 de junio, 1997.
- Seminario Latinoamericano de Investigación y Extensión Agroforestal. Panamá.
- Congreso ICRAF/WADI/IFIAD. México, June 19, 1997
- III Congreso Forestal de Costa Rica. San José, Costa Rica. 27- 29 de agosto, 1997.
- XVIII Simposio Latinoamericano de Caficultura, San José, Costa Rica, 16-19 September, 1997.
- III Congreso Forestal Centroamericano, San José, Costa Rica. September 15-17, 1997.

Research line 4:

- Human Dimensions of Sustainable Forestry Management for Global Climate Change. CATIE, Turrialba, Costa Rica, February 29 to March 1, 1997.
- Taller Internacional sobre el Estado Actual y Potencial de Manejo y Desarrollo del Bosque Secundario Tropical en América Latina. Pucallpa, Perú. 2- 6 de junio, 1997.
- Simposio internacional sobre posibilidades del manejo de bosques húmedos en América Tropical. Santa Cruz de la Sierra, Bolivia. 15 - 20 de julio, 1997.
- Jornadas de Investigación. Universidad de Costa Rica. 4- 8 de agosto, 1997.

- III Congreso Forestal de Costa Rica. San José, Costa Rica. 27- 29 de agosto, 1997.
- III Congreso Forestal Centroamericano. San José, Costa Rica. 15 -17 de setiembre, 1997.
- XI World Forestry Congress, Antalaya, Turkey, 13-22 October 1997.
- Ecology and Management of Tropical Secondary Forest: Science, People, and Policy. CATIE, Turrialba, Costa Rica, November 10-12, 1997.

Research line 5:

- Symposium on Human Dimensions of Natural Resources Management in the Americas. Belize City, Belize, February 26-28, 1997.
- Human Dimensions of Sustainable Forestry Management for Global Climate Change. CATIE, Turrialba, Costa Rica, February 29 to March 1, 1997.
- Annual meeting of the American Agricultural Economics Association, Toronto, Canada, July 27-30, 1997.
- III Congreso Forestal Centroamericano. San José, Costa Rica. 15 -17 de setiembre, 1997.
- XI World Forestry Congress, Antalaya, Turkey, 13-22 October, 1997.
- The Beijer Institute Research Seminar, Punta Leona, Costa Rica, November 6-8, 1997.

Appendix 4: Fund raising by research line

Projects approved in 1997

In 1997, CATIE's researchers, with the support of the Strategic Planning and External Cooperation Office, have raised approximately US$ 1.65 million (new resources) for new research projects. These new research projects approved in 1997 are:

Research line 1:

- The United States Department of Agriculture Evaluation, Regeneration and Enhanced Database Management of Unique Genetic Resources from Meso-America. CATIE: US$ 270,000. Started in March 1997. Duration 3 years.
- The American Cocoa Research Institute to give at the Plant Genetic Resources the amount of US$20.000 for maintenance and conservation of the international cocoa collection of CATIE.
- INCO - European Union: "Optimization of new strategies for local market bananas improvement" (contract ERBIC18CT970204). Partners and funds: CIRAD (Leader, $204 000 1E=$1.2), CATIE ($120 000), BAZIRG ($145 000), CRBP($126 000), FDA ($101 000). Started on September 1st, 1997. Duration: 4 years.
- INCO - European Union: "Sustainable improvement of nematode resistance in coffee cultivars (*Coffea arabica* L.) of Central America: enhanced use of genetic resources by the development of marker-facilitated selection programs" (contract ERB3514PL961462). Partners and funds: ORSTOM (Leader, $122.000), Trieste University ($123.000), CATIE (123.000 $) and PROMECAFE network (62.600 $). Started on September 1st, 1997. Duration: 3 years.
- Support of MAE-France to the development of a micropropagation pilot unit. Partners and funds : CATIE (20 000$). Started on September 1997. Duration: one year.

Research line 2:

- BID-INIBAP Project: "Multiplication of banana species tolerant to black sigatoka". Partners and funds: CATIE ($15 000). Started on august 1997. Duration: one year.
- USDA Development of Crop Associations for Managing Geminiviruses Vectored by Whiteflies in Tomatoes. The total budget for this three-year project amounts to $US 154.605.
- ENRECA, the Danish bilateral program for Enhancement of Research Capacity (sponsored by DANIDA) Collaborative research for the development of integrated weed management in maize and rice. Total budget: DKK 5,334,000.00 (DKK 3,985,000.00 for CATIE) for a three-year period.

Research line 3:

- Program for research on root competition between timber shade trees and coffee (two fully funded Ph.D. grants for 3 years). DM 266,000 was approved by the GTZ/TÖB (Germany).
- Funding has also been obtained from the Deutscher Akademischer Austauschdienst (DAAD) to support doctoral research candidates who will receive their Ph.D. (Agroforestry) from CATIE.

Research line 4:

- Project "Dynamics and management of fast growing tree species in Central America" was

approved by the Academy and Finland and FINNIDA. Total amount: 775.800 FIM (app. $US 144.000) for three years (1997-1999). Partner: University of Helsinki, Finland. Started in March 1997.

Research line 5:

- The World Resources Institute (WRI) has provided funding in the amount of U.S.$8,000 for preparing a joint (CATIE/WRI) Spanish language version of the report "New Partnerships for Sustainable Agriculture".
- SIDA (Sweden)/University of Gothenburg has provided funding in the amount of U.S. $16,000 for CATIE to produce a Spanish language version of the textbook "Economic Analysis of Environmental Impacts", including CATIE Latin American case-studies
- The FAO/FTP program has provided funding in the amount of U.S. $15,000 for CATIE to conduct research on forestry/agroforestry indigenous/participatory knowledge generation systems in two Central American Countries.

Table 1: Funding of the research program in 1997 (Mill.USD).

Area	Core budget	Projects	Total
Directorate	0.171	0	0.171
Sustainable Agriculture	0.794	1.202	1.996
Watershed Management and Agroforestry Systems	0.287	1.036	1.326
Management and Conservation of Tropical Forest and their Biodiversity	0.324	3.475	3.799
Economics and Sociology of Production and Conservation	0.163	0.012	0.164
Total	**1.739**	**5.715**	**7.454**

Appendix 5: Publications 1997-1998

1. Papers in scientific journals

Anthony F., Bertrand B., Lashermes P., Charrier A. 1997. La Biologie Moléculaire en appui a l'amélioration génetique du caféier Arabica. Plantations, Recherche, Développement 4(6):369-377.

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Appendix 6: Strategic Planning and External Cooperation

Table 1 shows in detail all the new projects that were successfully negotiated during 1997

Table 1 Projects successfully negotiated, 1997

PROJECT	SUBJECT	DONOR	TIME FRAME	AMOUNT US$
Proceedings from the Seminar/Workshop on Practical Silviculture Research Experiences in Natural Forests in Tropical America	Publication of the Proceedings.	CIFOR	1997-1998	3,500.00
Regional Project for Natural Resources and Environmental Management	Approval of the final reprogramming of funds to cover final expenditures.	USAID		85,136.00
Addendum to the Agreement 28-96	To increase the amount to be transferred to CATIE.	MAGA/Guat.	1997	200,000.00
XIX Int. Protected Areas Course	Support to the XIX International Protected Areas Course.	WWF	1997	20,000.00
Agreement No. 39/96	Administration of financial resources of various projects within the Forestry Plan of Action of Guatemala (PAFG).	MAGA	1997-1998	196,683.00
Musa Research and Technology Transfer Network Project	Execute activities related to the duplication and *in vitro* conservation of banana and plantain germplasm from the IPGRI-INIBAP-CATIE (ITC) Transit Center.	IPGRI/INIBAP	1996-1998	14,000.00
XIX Int. Protected Areas Course	Support to the XIX International Protected Areas Course	UNESCO	1977-1998	30,000.00
Support Capacity Building in Environmental Economics in Central America	To improve the environmental economics skills of CA M.Sc. students, and increase the capacity of environmental economics educators in CA and among CA policy makers.	Environmental Economics Unit EEU	1997	101,744.00
Project on the Management of Secondary Forests in the Humid Tropical Lowlands of Latin America	To provide the services of a Scientific Coordinator for the joint research Project.	CIFOR/IDB	1997-1998	110,800.00

PROJECT	SUBJECT	DONOR	TIME FRAME	AMOUNT US$
Mayan Biosphere Project	Administration of funds of the National Advisory for Protected Areas (CONAP) for the Mayan Biosphere Project.	AID/CONAP	1997-1999	1,166,666
Support Capacity Building in Environmental Economics in Central America Project	To improve the environmental economic skills of CA M.Sc. level students, to increase the capacity of environmental economics educators in CA and to increase environmental economics knowledge among CA policy makers.	EEU	1997	91,146.00
Strategic Course "Environmental Management for Watershed Management"	Support to the Strategic Course "Environmental Management for Watershed Management"	WWF-US/ COSUDE	1997	5,000.00
Addendum No. 48-97 to the Agreement 36-92 between MAGA/CATIE	Modification of the Agreement.	MAGA	1997-1999	US$321,027 Q2,000.000
Agreement CATIE/INAB	Administration of funds to facilitate the execution of twelve INAB Projects in Guatemala.	INAB	1997-1998	US$459,652 Q2,863.630
Addendum No. 47-97 to the Agreement 18-93 between MAGA/CATIE	To increase the amount to be transferred to CATIE.	MAGA	1997	US$160,514 Q1,000.000
Addendum No. 19-97 to the Agreement 31-94 between MAGA/CATIE	To increase the amount to be transferred to CATIE.	MAGA	1997	US$802,568 Q5,000.000
Addendum No. 46-97 to the Agreement 98-95 between MAGA/CATIE	To increase the amount to be transferred to CATIE.	MAGA	1997	US$160,514 Q1,000.000
Letter of Understanding UICN-ORMA/CATIE	To map the Gulf of Fonseca for the Geographical Information System.	UICN-ORMA	1997	52,000.00

PROJECT	SUBJECT	DONOR	TIME FRAME	AMOUNT US$
Addendum No. 53-97 to the Agreement 99-95 between MAGA/CATIE	Transfer of money for administrative support to the Executing Unit of the Management and Conservation of the Renewable Natural Resources Project of the High Watershed of the Chixoy River	MAGA	1997	US$355,492 Q2,214.716
Integrated Crop Management of Vegetable and Tropical and Sub-tropical fruits	To provide the third-year funds for a 3-year project and the additional fund.	USDA	1997	46,000.00
Economic Analysis of Environmental Impacts Project	To translate into Spanish, edit and publish the book Economic Analysis of Environmental Impacts.	SIDA/ASDI	1997-1998	US$13,000 SEK100,000
Agreement No. PIF-02-97 CATIE/INAB	To administrate financial resources of projects benefiting from the Fiscal Incentives Program, specifically in the area of supervision and fiscalization.	INAB	1997-1998	US$160,514 Q 1,000,000
Amendment CATIE/USDA	Development of Crop Associations for Managing Geminiviruses Vectored by Whiteflies in Tomatoes.	USDA	1997-1999	154,605.00
Agreement CATIE/IPGRI/ INIBAP	To execute activities related to the beginning of a Regional Center for the *in vitro* Multiplication and Distribution of banana and plantain cultivars which are resistant to Black Sigatoka, form the IPGRI-INIBAP Transit Center (ITC), as a service to Central American and Caribbean countries, as part of the "Research and Technology Transfer Network for the Musa genre" project.	IPGRI/INIBAP	1997-1998	15,000.00
Contract between CATIE/CIFOR	For further development of the MIRASILV system.	CIFOR	1997	20,000.00

PROJECT	SUBJECT	DONOR	TIME FRAME	AMOUNT US$
Contract Management CATIE/USAID	The project has three components: **Panama Canal Watershed Management** which focuses on the importance of the Canal Watershed and INRENARE's role; **National Park and Wildland Management** to establish INRENARE's permanent and physical presence in national parks and reserves; and a **Conservation Foundation** to enhance public and private sector collaboration in the management of Panama's natural resources.	USAID	1997-1998	246,627.00
Contractual Agreement CATIE/CIFOR	For the implementation of the *"Regional Workshop on Marketing of Non-traditional Timber Species from Central America"*	CIFOR	1997	5,000.00
Subsidy Agreement No. PW44 CATIE/WWF/ COSUDE	To support the Workshop on *"Commercialization of non-traditional timber species of the tropical forests of Central America"*	WWF/COSUDE	1997	4,100.00
Grant No. FB02 CATIE/WWF	To support *"LAC Regional Certification Conference"*	WWF	1997	31,945.00
Contract CATIE/CIFOR	To cover activities for the Project *"The role of remote sensing in monitoring tropical forest fragments in Costa Rica"*	CIFOR	1997	15,000.00
Letter of Agreement CATIE/FAO	Activities to be developed within the framework of the Network of Collaboration in Genetic Resources of *Cedrela* and *Swietenia* species in the Neotropics	FAO	1997	5,000.00
Addendum No. 129-97 to the Agreement No. 100-97 CATIE/MAGA	To amplify the initial amount	MAGA	1997	US$197,258 Q1.228,915
Agreement CATIE/DANIDA	To execute the *"Bridge Phase of the Agroforestry Project"*	DANIDA	1997	71,475.00

PROJECT	SUBJECT	DONOR	TIME FRAME	AMOUNT US$
Subsidy Agreement No. PW53 WWF/CATIE	Support to the *"III International Course on Rural Development based on Tropical Natural Ecosystems Management"*	WWF	1997	8,000.00
Contract CATIE/CEE-INCO-DG	Develop activities of the Project *"Optimisation des nouvelles stratégies d'amélioration de bananiers pour les marchés locaux"*.	EC	1997-2001	US$645,161 ECU580,000
Agreement No. 001-97 CATIE/ICTA	Administration of funds by CATIE for the technical and administrative functioning of Integrated Pest Management in Non-traditional export crops Project in Guatemala.	USAID/ICTA	1997	US$490,883 Q.3,058,204
Technical Cooperation Project CATIE/EMBRAPA-CPATU	Productive forest management at the small producers' level in the Micro-region of Bragantina, northeast Pará.	EMBRAPA/ CIFOR	1997-2002	907,000.00 899,960.00
Agreement CATIE/ CIFOR/IPGRI	To strengthen forest genetic resource's conservation, mainly the development of methodology for *in situ* conservation in tropical forests.	IPGRI	1997-1998	25,000.00
Grant Agreement CATIE/CIFOR	To carry out a socioeconomic survey on the use of secondary forests by small farmers and rural communities in three localities (San Carlos-El Tule, Boca de Sábalos-Buena Vista-La Lupe and possibly Las Azucenas or Esperanza) in the department of Rio San Juan, Nicaragua.	CIFOR	1997	7,500.00
Collaboration Agreement CATIE/IFAS (University of Florida)	For the execution of the Project ***"Development of Crop Associations for Managing Geminiviruses Vectored by Whiteflies in Tomatoes"***.	IFAS/UF	1997-2000	46,050.00
TOTAL				**US$8,751,965**

Table 2 Projects Successfully negotiated in 1998

PROJECT	SUBJECT	DONOR	TIME FRAME	AMOUNT US$
Agreement CATIE/DANIDA	To execute the bridging phase of the Olafo Project	DANIDA	January 01, 1998 June 30, 1998	249,475
Agreement CATIE/DANIDA	To execute the bridging phase of the Agroforestry Coordination Project	DANIDA	January 01, 1998 June 30, 1998	153,000
Agreement CATIE/DANIDA	To execute the bridging phase of PROSEFOR.	DANIDA	January 01, 1998 June 30, 1998	294,700
Letter of Understanding for Institutional Cooperation between the CATIE-GTZ Agroforestry Project and PRONAVHI	To join of both institutions to develop formation and training programs in areas related to agroforestry systems. The idea is to strengthen and empower planning and implementation abilities of community and regional organizations that support PRONAVHI in its initiatives for integrated improvement of indigenous communities	GTZ	January 01, 1998 July 31, 1999	3610
Agreement on Support to Capacity Building in Environmental Economics in Central America CATIE/European Economics Unit (EEU)	i. To improve the environmental economics skills of CA M.Sc. students. ii. To increase the capacity of environmental economics teachers in CA. iii. To increase environmental economics knowledge among CA policy makers.	EEU	January 01, 1998 December 31, 1998	87,829
Subcontract between Abt Associates Inc. and CATIE	To insure that the data and the quantity, quality and cost of services provided by the Subcontractor are obtained in an effective, systematic and professional manner that is consistent with the Prime Contract schedule.	BID	January 02, 1998 August 31, 1998	11,400
Agreement between CATIE/Executive Secretariat of the Aguila Network	To execute the Project ***"Complement and publish a book on the repercussions of Home Gardens in Central America"***.	IDRC	January 15, 1998 July 14, 1998	14,286,00
Support Agreement No. PW90 between CATIE/WWF	To conduct the ***"X International Intensive Course on Silviculture and Management of Tropical Natural Forests"***.	WWF/SDC	February 01, 1998 March 31, 1998	14,400

PROJECT	SUBJECT	DONOR	TIME FRAME	AMOUNT US$
Contract for Services CATIE/Department of International Development (DDI)	For professional services from the consultancy of Dr. Jorge Faustino, to advise CATIE about the technical aspects of the revised methodology for ecological ordering, to clarify the minimum procedures required by the relevant authorities, etc.	DDI	February 20, 1998 March 04, 1998	5600
Contract No. 700.533.8 CATIE/UNESCO	For the organization of the XXth International Protected Areas Management Course at CATIE.	UNESCO	March 01, 1998 March 30, 1998	20,000
Support Agreement No. PW 98 between CATIE/WWF	To support the ***"XX International Protected Areas Course"***	WWF/SDC	March 01, 1998 April 30, 1998	20,000
Letter of Understanding CATIE/PASOLAC	Determine, quantify and analyze the adoption and dissemination of soil conservation practices promoted by the Project ***"Rehabilitation of the sub-watershed of the Las Cañas River"***, in El Salvador using econometric and sociological methods.	PASOLAC	April 21, 1998 December 20, 1998	880
Services Agreement CATIE/FAO	To conduct the course ***"Forestry Project Formulation, Follow-up and Evaluation"***.	FAO	May 11, 1998 May 16, 1998	14,522
Agreement between CATIE and the Government of Germany	To continue the Project ***"Agroforestry Advising at CATIE"***.	GTZ	May 12, 1998 December 31, 2005	694,143
Contract Amendments CATIE/NRI	Additional funding to on-going CPP Project entitled ***"Management of herbicide resistant weeds in rice ZA0049"***	NRI	May 21, 1998 December 31, 1999	33,351 £19,959
Contract Amendments CATIE/NRI	Additional funding to on-going CPP Project entitled ***"The development of an integrated management strategy for Rottboellia cochinchinensis (itch grass) in maize-based cropping systems in selected areas of Latin America ZA0052"***	NRI	May 21, 1998 December 31, 1999	21.595,00 £12.854,00
Support Agreement No. PR36 CATIE/WWF	To conduct the ***"II Workshop on Participative Research: Base Document"***	WWF/SDC	June 01, 1998 August 30, 1998	5000

PROJECT	SUBJECT	DONOR	TIME FRAME	AMOUNT US$
Support Agreement No. PR44 CATIE/WWF	To conduct the course ***"Development of Agroforestry Systems"***	WWF/SDC	June 12, 1998 August 15, 1998	5500
Agreement between CATIE/DANIDA	The overall objective of the Programme is to contribute to sustainable use of natural resources in the Central American region in order to positively affect the living standard for the people in the region and maintain a productive resource base. The programmes are **Master's Programme, Agroforestry, Tree Seed, Management and Conservation of Natural Resources, and Impact Assessment, Monitoring and Evaluation.**	DANIDA	July 1st, 1998 June 30, 2001	4,707,000 DKK35,200,000
Contract CATIE/CACTU	To purchase electric conduction posts and wood for lumber	CACTU	July 20, 1998	19,531
Memorandum of Understanding CATIE/CABI	To collaborate to complement each other research, information and training effort in support of sustainable development in agriculture.	CABI	September 1, 1998 August 31, 2001	44,063
Agreement between CATIE/NORAD	To support the Integrated Pest Management (IPM, Phase III) and Agroforestry Program	NORAD	September 1st, 1998 August 30, 2003	10,125,000 7,467,650 NOK
Agreement CATIE/USDA	To hold the course ***"Evaluation of USAID ROCAP Scholarship Program and Developing Networks for Environmental Communication and Interpretation in Latin America and the Caribbean.***	USDA	September 25, 1998 September 30, 1999	23,000
Agreement CATIE/INCO-CEE	Presentation of a general evaluation tool and generic case studies, Project ***"CASFOR: Carbon Sequestration in Aforestation and Sustainable Forest Management"***.	EU	September 30, 1998 September 29, 2001	75,240 ECU 230,000
Agreement CATIE/INCO-CEE	To carry out the Project called ***"Tree resources outside forest: development of methods for assessment and monitoring of natural resources to support regional planning, with study areas in Central America"***	EU	October 1, 1998 September 30, 2001	164,956 ECU 650,000
Letter of Agreement CATIE/FAO	To create a Geographical Information System (SIG)	FAO	October 1st, 1998 December 31st, 1998	10,000

PROJECT	SUBJECT	DONOR	TIME FRAME	AMOUNT US$
Agreement between CATIE/CIFOR	To provide bridging funds for the transition period between the first and the second phase of the joint project: ***"Management of Secondary Forest in the Lowland Humid Tropics of Latin America"***	CIFOR	October 1st, 1998 December 31st, 1998	20,000
Services Contract between CATIE/FEI	To provide four months input consultancy services of the expert consultant: Mr. Markku Kanninen for ***"Proyecto de Apoyo a la implementación de la Convenciónintemación de Cambio Climático y del Protocolo de Montreal", assigned by the Ministry of Foreign Affairs of Finland.***	FEI	October 2, 1998 February 1, 1999	38,403 FIM 193,200
Memorandum of Agreement CATIE/CIMMYT/IDRC	To work in the publication of the book entitled ***"Cover Crop in Hillside Agriculture: Farmer Innovation with Mucuna"*** by Daniel Buckles, Bernard Triomphe, and Gustavo Sain.	IDRC CIMMYT	October 6, 1998	
Letter of Understanding CATIE/UICN/ University of Miami	To jointly publish the book ***"Manejo Productivo de Manglares en Centroamérica"***	UICN/UM	October 9, 1998	1750
Contractual Agreement between CATIE/CIFOR	For personal consulting services of Mr. Luis Ugalde Arias, to provide data in a format compatible with MS-Access (e.g. Tab or comma delimited text, MS-Excel).	CIFOR	October 12, 1998 December 31, 1998	12,000
Agreement CATIE/GTZ	To execute the Project ***"Promotion of the Production and Commercialization of Non-chemical Pest Control Techniques in Central America***	GTZ	October 22, 1998 December 31, 2006	3,000,000 DM US$1,626,898
Payment Agreement No. PR82 CATIE/WWF	To carry out the IV International Course in Rural Development based on Natural Tropical Ecosystems Management	SDC WWF-Switz.	October 26, 1998 November 30, 1998	6,432
Agreement CATIE/IGPRI	To undertake activities in relation to the Project ***"Cryopreservation of coffee seeds for long term conservation of coffee resources at CATIE"***.	IPGRI	November 1, 1998 October 31, 1999	7,000

PROJECT	SUBJECT	DONOR	TIME FRAME	AMOUNT US$
Subcontract Modification No 2. CATIE/Abt	To design a management plan for natural resources for the Río Grande de Tárcoles watershed	BID	November 09, 1998 November 16, 1998	28,600
Payment Agreement No. PR89 CATIE/WWF	To train forest workers in the Mayagna/Sumo de Awastingni community in low-impact forestry use techniques	WWF- Neth. WWF-N WWF-US	November 20, 1998 March 15, 1999	5000
Letter of Agreement CATIE/FAO	To prepare a study on the evaluation of forest resources in LA, within the FAO Project "Evaluation of Forest Resources 2000" (FRA 2000)	FAO	November 25, 1998 April 30, 1999	15,000
Agreement CATIE/INIBAP	To undertake activities in relation to the maintenance of a safety duplicate in-vitro collection of Musa germplasm at CATIE.	INIBAP	December 1st, 1998 December 31st, 1999	6,500
Agreement for services rendered CATIE/INTA	To train six groups (of five people each) of technical personnel in INTA's Territorial Agencies	INTA	December 07, 1998 February 28, 1999	39,000
Agreement between COSUDE and CATIE	To establish the Latin American Natural Forestry Chair in the Graduate School at CATIE	COSUDE	January 1999 December 2007	1,125,000
Extension of the PROSIBONA Project	To extend the PROSIBONA Project for three years more	COSUDE	January 1999 December 2001	197,861
Agreement with the Agriculture Secretariat	To cover membership fees in arrears for the Dominican Republic	SEA-Dom. Rep.	January 1999 December 2001	480,000
Agreement for Mahogany Research USDA/US Forest Service	To carry out research in Mahogany	USDA	January 1999 December 2001	94,292
Validation of a monitoring and evaluation methodology to strengthen participative strategy of the ordering of Natural Resources in the Estero Real, Nic.	To carry out this project	RIMISP		20,000
TOTAL				**$20,541,817**

During 1997 and 1998 new agreements were signed with different member countries' institutions to achieve a large variety of goals and needs, where CATIE can play a very important role as a leader institution in agricultural development and natural resources conservation. Table 3 below, shows these agreements in detail.

Table 3 Institutional agreements signed with CATIE in 1997 and 1998

AGREEMENT	OBJECTIVE	TIME FRAME
Inter-institutional Collaboration Agreement CONSEFORH/ COHDEFOR/CATIE	Support CONSEFORH in socio/economic aspects.	January, 1997 December, 1997
Annex to the Letter of Understanding CIFOR/CATIE	To extend the Letter of Understanding for conducting collaborative research on the Silviculture and Ecology of Lowland Secondary Forest for an additional period for two years beginning 1 January, 1997.	January, 1997 December, 1998
Letter of Understanding CATIE/ Orgut Consulting AB	Cooperation to organize the second part of the International Training Program on Forest Certification that will take place in Costa Rica November 27-December 26, 1997.	February, 1997 December, 1997
Memorandum of Understanding CATIE/UF	For the publication of a book on tropical agroforestry.	March, 1997 December, 1997
Letter of Understanding COHDEFOR/CATIE	To implement the Third Phase of the Conservation for Sustainable Development Project in Central America (Olafo) in Honduras.	March, 1997 December, 1997
Letter of Understanding CATIE/ UCA (Nicaragua)	Collaborate in the development of research on sustainable management of broadleaf natural forests, and curricular strengthening.	March, 1997 December, 1998
Contract Central Azucarera Turrialba/CATIE	Planting, purchase and delivery of sugar cane.	March, 1997 December, 1998
Agreement CATIE/Inter-American School Association	To loan the school grounds to the Inter-American School Association.	April, 1997
General Cooperation Agreement CATIE/AEC	To Form a legal framework for future operational agreements, specific letters of understanding or contracts for joint activities, which are necessary to examine, promote and carry out joint programs or projects aimed at environmental protection and conservation, and conservation and rational use of the Caribbean region's natural resources.	April, 1997 Indefinite
Addendum No. 63-97 to the Agreement 100-95 between MAGA(Guatemala)/CATIE	Modify No. 3, Clause 3.1, part c) of Contract No. 100-95.	May, 1997
Letter of Understanding CATIE/Natural Sciences and	Explore possibilities for research projects between CATIE and the ITIC Herbarium.	May, 1997

Mathematics Dept. of the University of El Salvador		
Collaboration Agreement CATIE/EAP	To conduct collaborative work between the institutions for the ODA/NRRD, Great Britain Project: "HOLDBACK PROJECT R6405 (H): Development and Adaptation of Novel Microbial Biological Control Technology for Whitegrubs in Tropical America".	May, 1997
Addendum No. 2 to the Cooperation Agreement ORSTOM/ CATIE/IICA	To execute an Applied biotechnology project in coffee	July, 1997 June, 1999
Institutional Cooperation Agreement CATIE/UNALM/FDA	Cooperate in the execution of activities in the "Secondary Forest Management in Tropical America" Project	August, 1997
Agreement of Collaboration between CATIE/University of Helsinki (UH)	To enhance the academic, scientific, and technical collaboration within their respective training and research.	August, 1997
Contract No. 540597 CATIE/CESA	Preventive and corrective maintenance of the numbered sections of the Annex A of the Contract.	August, 1997 July, 1998 Automatically renewable for equal periods
Memorandum of Understanding CATIE/EMBRAPA	Establish cooperation in science and technology through the identification and execution of joint projects in the areas of agriculture and natural resources, to amplify basic knowledge to encourage sustainable development of agriculture in both countries and strengthen the cooperation program between the institutions.	August, 1997 July, 2002
Letter of Understanding CATIE/UICN-HORMA	Cooperate in forestry training activities.	August, 1997 July, 1998
Agreement CATIE/AFE-COHDEFOR	To execute the Project *"Technology Transfer and Promotion of Professional Formation in Natural Forest Management"* (TRANSFORMA)	September, 1997 June, 2000
Agreement of Cooperation CATIE/Faculty of Forestry, Albert Ludwigs-U. of Freiburg	To encourage closer ties in education and research.	September, 1997 August, 2001
Memorandum of Understanding CATIE/INDUFOR OY	To cooperate in the bidding for the Biodiversity Support and Protected Areas Project for Nicaragua, tendered by the Government of Finland.	October, 1997
Agreement Framework CATIE/INIAP	To cooperate in training, research and sustainable development activities in the Andean region of South America.	November, 1997 October, 2002
Memorandum of Understanding between CATIE/University of Hohenheim	To intensify their existing scientific co-operation in teaching, research, and training, specifically in the area of tropical agriculture.	December, 1997 November, 2000
Cooperation Agreement between CATIE/IICA/IPGRI/	To create and operate the Mesoamerican Network of Plant Genetic Resources (REMERFI)	December, 1997

INIFAP/ICTA/DICTA/ CENTA/INTA/MAG/ IDIAP		November, 2002
Cooperation Agreement between CATIE/MAG-Nic.	Establish and strengthen, formal technical and scientific relationships, to coordinate joint activities to improve silvoagropastoril production in Nicaragua.	December, 1997 November, 2002 Automatically renewable every five years
Letter of Understanding CATIE/Olafo/INRENARE	To continue evaluations and research in *Carludovica palmata* and *Zamia skinner* plots during 1998 in the Teribe Region, Panama	January 01, 1998 December 31, 1998
Cooperation Agreement CATIE/SEA	To reach an agreement on how the Dominican Republic can pay in kind its membership dues debts to CATIE. These debts are from 1988-1996.	February 13, 1998 February 12, 2002
Memorandum of Understanding between CATIE/Louisiana State University and Agricultural and Mechanical College (LSU A&M College)	For students exchanges.	January 14, 1998 January 13, 2003
Cooperation Agreement CATIE/INPARQUES	To cooperate in training, research and sustainable development activities in Venezuela's National Park.	February 18, 1998 February 17, 2003 Renewable for similar periods (every 5 years)
General Cooperation Agreement CATIE/INTA-Argentina	1. Join and complement efforts and capacities to strengthen INTA's personnel's technical capacity in forestry and agroforestry research and extension, and other matters of mutual interest. 2. Identify, prioritize and subscribe agreements to conduct cooperation activities considering need, demand, opportunity and capacity of both parties. 3. Elaborate and negotiate letters of understanding or projects proposals that determine the aspects, objectives, inputs, activities, expected products, time frames and responsibilities and rights of both parties.	May 15, 1998 May 14, 2003
Memorandum of Understanding between CATIE/CETSAF-Georg-August-University of Göttingen	To intensify their existing scientific co-operation in teaching, research, and training, specifically in the area of tropical agriculture.	June 8, 1998 June 7, 2001
Technical Cooperation Agreement between CATIE/FONAES	Join efforts, resources and scientific-technical knowledge to develop joint extension, training, research and technical assistance activities, to	June 17, 1998 December 31st, 2002

	encourage the cultivation of forest species, according to national needs, at the rural community level, and to CATIE's and FONAES' research lines.	
Agreement CATIE/MINAE	To execute the Natural Forest Silviculture Project in Villa Mills Experimental Area	June 17, 1998 December 31, 2003 Automatically renewable every 5 years
Addendum No. 2 to the Technical Cooperation Agreement CATIE/AEK	To develop work and joint collaboration under the Project PD 1/96 Rev. 3 (F) ***"Sustainable Management of Correction Forests of Narganá, of the Kuna Yala indigenous reserve, Panama"***	July 13, 1998 July 12, 2003
Contract for Capital Transfer CATIE/Milk Producers' Cooperative, R.L (Dos Pinos)	Transfer of capital and pay the total equivalent to forty-four kilograms.	July 14, 1998
Private Bid Contract 03-98	To construct the transportation area installations.	July 15, 1998
Service Contract CATIE/Hotel Best Western Jaco Beach	For lodging and board and other costs for the Seminar/Workshop to disseminate information about achievements from five years of research.	July 15, 1998 July 17, 1998
Agreement CATIE/Instituto de Tabasco	To establish a cooperation program for research, technical support, education and training	August 28, 1998 August 27, 2003
Contract CATIE/CESA	For preventive and corrective maintenance of the slides stipulated in Annex A, so that these can function normally	September 04, 1998 September 03, 1999
Cooperation Agreement CATIE/MAG	To establish formal technical and scientific cooperation links to coordinate joint activities needed to carry out the mission and objectives of this Agreement.	October 6th, 1998 October 5th, 2003 Automatically renewable for similar periods
Agreement CATIE/IICA/CRS/UCA	To execute and administrate the Soil Conservation and Agroforestry components of the PAES Project (CSA-PAES).	October 07, 1998 Until the end of the Consulting Agreement for the execution of PAES
Memorandum of Understanding IRG/CATIE	For preparation of the Proposal for the USAID Biodiversity and Forestry Services IQC, RFP No. M/OP-98-1398.	October 14, 1998 October 13, 1999
Agreement between	To collaborate in the development of field	October 15,

CATIE/Empresa Agroindustrial La Chonta Ltda.	research for Sustainable Natural Forest Management, through Permanent Measurement Plots (PMP).	1998 January 31, 2000
Agreement CATIE/Abbot Laboratories	For confidential disclosures to Abbot.	October 15, 1998 October 15, 2001
Memorandum of Agreement CATIE/Texas A&M University	For the exchange of faculty and staff for joint teaching and research in the area of agriculture and life sciences.	October 19, 1998 August 2, 2000
Letter of Understanding CATIE-PROSEFOR/DGRNR de El Salvador	To create a rotating fund to be used exclusively for buying and selling forest seed of the species of greatest demand, from seed sources selected and managed by CEDEFOR and PROSEFOR/CATIE, and which belong to private producers	October 19, 1998 October 18, 2000
Agreement between CATIE/Cooperativa Coopemadereros R.L.	To collaborate in the development of research on sustainable secondary natural forest management in the Southern Pacific Region of Costa Rica, specifically in the Ian Hutchinson Model Forest	October 23, 1998 December 31, 2001
Agreement CATIE/UAW	Share information, results and publications generated from this Agreement, and which are shared property of CATIE and the UAW. In addition, information will remain in CATIE's databases, and its dissemination systems. At least one workshop will be organized to disseminate research results from the UAW.	January 1st, 1999 March 31st, 1999

Table 4. Bids under negotiation or won in 1998

BIDS UNDER NEGOTIATION OR WON IN 1998

TITLE	*SENT TO*	*AMOUNT US$*	*STATUS*
Plan Nacional de Investigación y Transferencia de Tecnología y Recursos Humanos de Honduras DICTA	FOHPREI	US$200,000	Pre-qualification stage
Plan de Manejo Integral de la Cuenca del Río Grande de Tárcoles, Costa Rica	IDB	$800,000 To execute: depends on the number of contracts carried out	ABT Associates won the bid, and sub-contracted CATIE to conduct various studies.
Management of the Lempa River Watershed, El Salvador. CATIE-IICA-CRS-UCA consortium. PAES	IDB	$30,000,000 To execute: $8,463,663	CATIE won the bid, and has begun initial gruondwork
Socio-environmental and forestry development project for the Carazo River Watershed (Nicaragua) POSAF	IDB MARENA FND	To execute: US$340,000	Sub-contract offered to CATIE.
Nicaragua's Environmental Program	MARENA FINNIDA	$3,251,842	Won by the INDUFOR/ CATIE/Biota Consortium
Thematic Evaluation on Environment and Development in the Finnish Development Corperation (Nicaragua)	Ministry of Foreign Affairs, Finland	To execute: US$ 4500	The Finnish Environmental Institute won the bid, and invited CATIE to work with them.
Tropical Forests Conservation Program (PROSELVA)	KFW (Germany)	$18,000,000 To execute: $4,482,078	CATIE works in conjunction with IICA in the agronomic component and alone in the Protected Areas component
Institutional strengthening, and impact evaluation PROSESUR	PNDR IDB	To execute: $ 177,330	Presented to PNDR
Sustainable Development Program in Peten, Guatemala	IDB	$20,000,000 To execute: $1,880,000	The bid was won by CATIE
Proposal to Elaborate a Strategy to Increase the Supply of Fuelwood and Improve Energy Efficiency in the Pacific Region of Nicaragua (PROLEÑA)	INE/IDB	To execute: $85,958	The CATIE/PROLEÑA consortium won the bid and is negotiating the economic offer
TOTAL		**$18,685,371**	

Table 5. Budget of current projects by Area, during 1998, in US$

PROJECT	DONOR	BUDGET
CATIE's CORE BUDGET		
Swedish Contribution to CATIE for Untied Budget Support SIDA 1,250,000		
Maintenance and scholarships	FUNDATROPICOS	472,644
Professorship/FUNDATROPICOS	COSUDE	150,879
Support to the Masters Program	DANIDA	500,000
EDUCATION FOR CONSERVATION AND DEVELOPMENT		
Remote Sensors CIFOR 15,000		
Support to CATIE's scholarship Program	WWF	10,300
Institutional Strengthening Program	Dutch Govt.	341,210
University of Alberta/University of Laval. Development of Postgraduate Studies	IDCR-CIID	9,989
RESEARCH PROGRAM		
Sustainable Tropical Agriculture Area		
Whitefly-vectored geminivirus in Tomatoes	USDA	51,535
Database for Genetic Resources	USDA	100,542
Selection and Generation of Moniliasis Resistant Cocoa Genotypes	ACRI	30,000
Maintenance of Cocoa Collections at CATIE	ACRI	20,000
Support to the Integrated Pest management (IPM) Project for Nicaragua, Phase II	NORAD	339,324
Research on *Musa*	INIBAP	25,000
Tropical Fruit and Vegetable crops	USDA	8,753
Development of an Integrated Management Strategy for *Rottboellia cochinchinensis* (itch grass) in Maize-Based Cropping Systems in Selected Areas of Latin America	NRI	125,317
Management of Herbicide Resistant Weeds in Rice X0336.	NRI	90,612
Biological Control of *Phyllophaga*	ODA/NRI	101,110
Sustainable improvement of coffee in Central America	EC/INCO	64,031
Optimisation de nouvelles strategies d'omilloration de bananiers pour les marches locaux	EC/INCO	38,852

PROJECT	DONOR	BUDGET
Agroforestry Systems Area		
DANIDA Agroforestry Coordination	DANIDA	177,000
GTZ Agroforestry Systems	GTZ	287,296
GTZ Goats	GTZ	9,281
Chixoy Forestry Extension	IDB	778,811
Interaise	IUCN	10,762
Farming Systems in the Cayo, Stann Creek and Folido Districts, Belize	USAID	17,967
U. of Wageningen Project	UAW	37,800
Tropical Forest and Biodiversity Management		
CATIE/CONAP Project	USAID	482,567
Modeling the Genetic Effects of Forest Fragmentation	CIFOR/IPGRI	86,916
DANIDA Seeds	DANIDA	669,314
Genetic Diversity of Mahogany	EC	45,544
Silviculture of Natural Forests, PROSIBONA	COSUDE	409,116
Technology Transfer and Promotion of Professional Formation and Natural Forest Management, TRANSFORMA	COSUDE	610,683
Secondary Forest Management in the American Tropics. Collaborative Research with Emphasis on the Forest Margins	CIFOR	225,456
Assistance for Training in Protected Areas in Panama	USDA	195,751
WWF Regional Coordination	WWF	36,600
Sustainable Development (OLAFO)		
Production & Conservation Economic and Sociology Area	DANIDA/	
NORAD	410,119	
Translation and edition of the Economics book	SIDA	12,182
Support to Research and Capacity Building in Environmental Economics in Central American Development	SIDA	83,619
OUTREACH PROGRAM		
Communication and Information Area		
Agroforestry in the Americas Journal	DANIDA	54,000
Further Development MIRA System Consistent with the Requirements of the TROPIS	CIFOR	9,662
Aguila Network	IDRC	14,286
Rapid Application of Ag. Information Systems	FAO	13,840
Biotechnology (Support to the Library)	ORSTOM	4,700
Strategic Planning and External Cooperation		
Project Monitoring and Impact Assessment	DANIDA	81,402
TOTAL		**8,509,772**

Table 6 CATIE's Associated Principal staff (APS) seconded by different countries and institutions in 1997-1998

Country or Institution	1997	1998	Country or Institution	1997	1998
Denmark	1	1	World Wildlife Fund	2	2
France			INIBAP	2	2
CIRAD	3.5	1	Independent	---	2
ORSTOM	1	1	IUCN	1	1
Germany	1	1	CIFOR	1	1
Netherlands	7	3	CIM	2	2
Switzerland	1	1	PNUD	1	---
United Kingdom	2	---			
Sweden	1	1	**TOTAL**	**26.5**	**19**

Table 7 shows an estimate of the contributions received through the strategic alliances with donor institutions and which include the staff of table 6 above.

Table 7. Counterpart contributions of strategic allies during the period 1992-1998, in US$ thousands

INSTITUTION	1992	1993	1994	1995	1996	1997	1998
CIRAD-France	600	850	850	850	600	600	600
IPGRI/INIBAP	150	150	150	150	200	249	250
NRI-United Kingdom	250	300	250	250	180	180	75
COSUDE-Switzerland	495	495	400	495	300	100	100
GTZ-Germany	500	400	400	400	250	250	180
ODA-United Kingdom	200	200	200	200	50	---	---
UA Wageningen-The Netherlands	45	45	70	70	70	70	70
DGIS-The Netherlands	150	150	150	150	150	200	200
MAE-France	90	90	90	90	80	80	80
WWF-United States	140	140	200	250	250	250	250
ORSTOM-France	150	346	385	405	315	200	200
FINNIDA-Finland	---	180	300	300	300	50	---
Penn State University	---	125	125	75	20	---	---
ICRAF	---	---	25	30	30	30	30
ISNAR	---	---	20	50	---	---	---
CIFOR	---	---	30	125	200	300	300
UICN	---	---	25	25	40	40	40
CIAT	---	---	---	75	75	---	---
Laval University/University of Alberta-CIID	---	---	---	35	40	40	20
University of Veterinary Medicine-Denmark	---	---	---	50	75	40	---
DANIDA-Denmark	---	---	---	---	200	200	200
CIM	---	---	---	---	100	150	150
SIDA-Göteborg	---	---	---	80	125	200	125
USDA	---	---	---	---	---	---	30
University of Idaho	---	---	---	---	---	---	20
Gilberto Páez	---	---	---	---	---	---	100
TOTALS	**2,770**	**3,471**	**3,670**	**4,155**	**3,650**	**3,229**	**3,020**

Table 8 shows the total investment in research, graduate education, training and outreach during 1994, 1995, 1996 and 1997 considering the estimate of contributions received as strategic allies as presented in table 7 above.

Table 8. Total investment in research, graduate education, training and outreach, during 1994, 1995, 1996m 1997 and 1998, in US$ thousands.

DESCRIPTION	1994	1995	1996	1997	1998
Core budget	5,613	5,667	7,482	10,266	8,861
Projects	11,170	10,980	7,145	6,430	6,136
Strategic alliances	3,670	4,155	3,650	3,229	3,020
Contracts and bids	---	---	---	---	19,685
TOTALS	20,453	20,802	18,277	19,925	37,702

Appendix 7: Council of Ministers and Boards of Directors

COUNCIL OF MINISTERS

BELIZE
Dr. Russell García (until mid-1998)
Dr. Daniel Silva
Minister of Agriculture and Fisheries

COLOMBIA
Dr. Cecilia López (until mid-1998)
Dr. Carlos Murgas
Minister of Agriculture and Rural Development

COSTA RICA
Ing. Ricardo Garrón (until mid-1998)
Dr. Esteban Brenes/Chairman of the Council
Minister of Agriculture and Livestock

DOMINICAN REPUBLIC
Ing. Frank Rodríguez (until mid-1998)
Ing. Agr. Amîlcar Romero
Secretary of Agriculture

EL SALVADOR
Ing. Agr. Ricardo Quiñones
Minister of Agriculture and Livestock

GUATEMALA
Lic. Mariano Ventura
Minister of Agriculture, Livestock and Food

HONDURAS
Ing. Agr. Ricardo Arias (until mid-1998)
Ing. Agr. Pedro A. Sevilla
Minister of Agriculture and Livestock

MEXICO
Ing. Agr. Romárrico Arroyo
Secretary of Agriculture, Livestock and Rural Development

NICARAGUA
Dr. Mario De Franco
Minister of Agriculture and Livestock

PANAMA
Ing. Carlos Sousa-Lennox (until mid-1998)
Ing. Agr. Manuel Miranda
Minister of Agricultural Development

VENEZUELA
Dr. Raúl Alegret (until mid-1998)
Dr. Alejandro Riera
Minister of Agriculture and Livestock

INTER-AMERICAN BOARD OF AGRICULTURE (IABA)
Dr. Arlindo Porto (until 1998)
Dr. Francisco Sergio Turra
Minister of Agriculture and Agrarian Reform of Brazil

INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE (IICA)
Ing. Agr. Carlos Aquino
General Director

CATIE
Dr. Rubén Guevara
Ex -officio Secretary

BOARD OF DIRECTORS (as of Dec. 31, 1998)

Ing. Irma Acosta de Fortín (Honduras) (1995-1999)
Chairman, Board of Directors
Chairman, Executive and Finance Committee

Mr. Adrian Sommer (Switzerland) (1997-2000)
Vice-Chairman, Board of Directors
Chairman, Scientific-Academic Committee
Chairman, Nominations Committee

Dr. Frank Bendaña (Nicaragua) (1992-1999)

M.Sc. Iain MacGillivray (Canada) (1995-2001)

Dr. Larry Boone (United States) (1998 - indefinite)
Designated by IICA

Dr. Gregorio Contreras (El Salvador) (1998 – indefinite)
Alternate member designated by IICA

Dr. Jochen Heuveldop (Germany) (1998-2001)

Dr. Eugenia Muchnik (Chile) (1998-2001)

Lic. Roberto Ortiz (El Salvador) (1997-2000)

Dr. Whetten Reed (United States) 1992-1999)
Elected by the IABA

Dr. Victor M. Villalobos (Mexico) (1998-2001)

Dr. Rubén Guevara (Honduras)
Ex –officio Secretary

Mrs. Theresa White
Technical Secretary

FUNDATROPICOS BOARD OF DIRECTORS (as of Dec. 31, 1998)

Mr. H.G. Pattillo
Chairman, Board of Directors

THE TROPICS FOUNDATION BOARD OF DIRECTORS (elected on Nov. 9, 1998)

Mr. Gaylord Nelson
Former Senator and Governor of Wisconsin
Honorary Chairman of the Board

Mr. L. Harlan Davis
Vice President, Outreach, University of Georgia
Former Deputy Director General of IICA
Chairman of the Board

CATIE'S DONOR SUPPORT GROUP

Ms. Carmen Alvarado
Chairman of the Donor Support Group
Programs Advisor, COSUDE

Representatives from:
Swedish International Development Agency (SIDA)
Canadian International Development Agency (CIDA)
Norwegian International Development Authority (NORAD)
Danish International Development Agency (DANIDA)
Ministry of Foreign Affairs of France
Swiss Development Cooperation (SDC)
Deutsche Gesselhaft für Technische Zusammenarbeit (GTZ-Germany)
United States Department of Agriculture (USDA)
Finnish International Development Agency (FINNIDA)
Ministry of Foreign Affairs of the Netherlands)
Department for International Development (DFID-Great Britain)
Spanish International Cooperation (AECI)

Appendix 8: STRATEGIC ALLIANCES

MEXICO

- Secretariat of the Environment, Natural Resources and Fisheries (SEMARNAP)
- Secretariat of Agriculture, Livestock and Rural Development (SAGAR)
- Research and Higher Education Center of the National Polytechnical Institute (CINVESTAV)
- National Science and Technology Council (CONACYT)
- Chapingo Autonomous University (UACH)
- Autonomous University of Nuevo León
- University of Colima
- National Autonomous University (UNAM)
- Institute for the Development of Production Systems in the Humid Tropics in Tabasco
- National Polytechnical Institute (IPN)
- Agricultural Technology Institute in Oaxaca No. 23 (ITAO)
- Postgraduate School Chapingo (CP)
- Genfor Group
- Maderas del Pueblo del Sureste, A.C.
- Latin American Rural Tropics, A.C.
- Agroforestry Center for Sustainable Development
- Mexican Agricultural and Forestry Research Institute (INIFAP)
- Fundaciones Produce

GUATEMALA

- Ministry of Agriculture, Livestock and Food (MAGA)
- Institute of Agriculture Science and Technology (ICTA)
- National Forestry Institute (INAB)
- National Coffee Association (ANACAFE)
- National Agroforestry Research and Development Association
- National Environmental Commission (CONAMA)
- National Protected Areas Council (CONAP)
- General Directorate of Agricultural Services (DIGESA)
- National School of Agriculture (ENA)
- Departmental Government of Petén
- Guatemalan Forestry Action Plan
- PROSAF-SARES FOUNDATION
- Mayan Biosphere Center
- Executing Unit of the Management and Conservation Project of Renewable Natural Resources in the Chixoy River Watershed (UNEPROCH)
- Sectorial Unit for Agricultural Planning (USPADA)
- University of San Carlos
- Del Valle University
- GEPROX Agricultural Exporters Association

HONDURAS

- Secretariat of Agriculture and Livestock (SAG)
- Secretariat of Natural Resources and the Environment (SERNA)
- Secretariat of Public Works, Transportation and Housing (SOPTRAVI)
- Directorate of Agricultural Science and Technology (DICTA)
- Honduran Corporation on Forestry Development (COHDEFOR)
- Honduras Agriculture Research Foundation (FHIA)
- Regional University Center in the Atlantic Zone (CURLA)
- Panamerican Agriculture School (Zamorano)
- National Forestry Sciences School (ESNACIFOR)
- José Cecilio del Valle University
- National Autonomous University of Honduras (UNAH)
- Inter-American Development Bank
- National Sustainable Development Advisory (COINADES)
- National Forestry Extension Commission (CONAEX)
- National Forestry Research Commission (CONIFA)
- Colon-Atlantida Regional Cooperative, Ltd. (COATLALH)
- Honduras Guild of Forestry Professionals (COLPROFORH)
- Honduran Federation of Community Development (FEDECOH)
- Rural Development Plan for the Western Region (PLANDERO)
- Central American Forestry-Protected Areas Council (CCAB/AP-CCAD,SICA)
- Honduran Coddee Institute (IHCAFE)

COSTA RICA

- Ministry of Agriculture and Livestock (MAG)
- Ministry of the Environment and Energy (MINAE)
- National Association for Indian Affairs (ANAI)
- Costa Rican Chamber of Forestry (CFC)
- Worldco, S.A.
- National Advisory for Scientific and Technological Research (CONICIT)
- COOPIBO-Costa Rica
- Agriculture School of the Humid Tropical Region (EARTH)
- Neotropica Foundation
- Foundation for the Development of the Central Mountain Range (FUNDECOR)
- Costa Rican Coffee Institute (ICAFE)
- Costa Rican Electricity Institute (ICE)
- National Forestry and Rural Board (JUNAFORCA)
- National Conservation Areas System (SINAC)
- Tempisque River Watershed Management Project (FAO)
- International Center for Economic Policy for Sustainable Development (CINPE)

- Tropical Natural Resources, S.A.
- Sol Caribe Macadamia Co.
- University of Costa Rica (UCR)
- University for Peace
- Distance Education University (UNED)
- Costa Rican National University (UNA)
- Latin American Science and Technology University (ULACIT)
- Villa Mills samll farm producer's Association

EL SALVADOR

- Ministry of Agriculture and Livestock (MAG)
  - General Directorate for Renewable Natural Resources (DGRNR)
  - Environmental Sector Unit (OSPA/MAG)
- Ministry of Natural Resources and Environment (SEMA)
- National Center for Agricultural and Forestry Technology (CENTA)
- Agency for Economic and Local Development (ADEL-Chalatenango)
- Association of Cooperatives for Integrated Agricultural Production (ACOPAI)
- Salvadoran Association for Rural Health (ASAPROSAR)
- Agricultural and Agroindustrial Chamber (CAMAGRO)
- Center for Education in Rural Development (CEDRO)
- Center for Disaster Protection (CEPRODE)
- Salvadoran Center for Appropriate Technology (CESTA)
- Community Youth Development
- National Agriculture School "Roberto Quiñones" (ENA)
- Salvadoran Environmental Fund (FONAES)
- Salvadoran Fund for Initiatives in the Americas (FIAES)
- Salvadoran Foundation for Economic and Social Development (FUSADES)
- Salvadoran Foundation for Coffee Research (PROCAFE)
- Chalatenango Department Development Project (PROCHALATE)
- Salva NATURA
- Western Catholic University (UNICO)
- "José Simón Cañas" Central American University (UCA)
- University of El Salvador
- Evangelical University of El Salvador
- Latin American Technical University (UTLA)
- Catholic Relief Services

NICARAGUA

- Ministry of Agriculture, Livestock and Forestry (MAGFOR)
- Ministry of the Environment and Natural Resources (MARENA)
- Ministry of Economic Development
- Rural Development Institute (IDR), formerly National Rural Development Program (PNDR)
- National institute of Technology and Agriculture Technology Transfer (INTA)
- Central American University (UCA)
- National Agrarian University (UNA)
  Faculty of Natural Resources and the Environment (FARENA)
- Social-Environmental and Forestry Development Program (POSAF)
- Rural Development Project for the Southern Pacific Dry Region (PROSESUR)
- Environment and Natural Resources Commission of the National Assembly
- Nicaraguan Coffee Commission - CONICAFE
- Center for Genetic Improvement and Forest Seed Bank (CMG-BSF)
- Nicaraguan Foundation for Conservation and Development (FUNCOD)
- CIAT's Program for Sustainable Agriculture on Hillsides in Central America
- TECHNOSERVE
- National Union of Agricultural and Livestock Producers (UNAG)
- National Agriculture Information and Documentation Center (CENIDA)

PANAMA

- Ministry of Agricultural Development (MIDA)
- Panamanian Institute of Agricultural Research (IDIAP)
- National Environmental Authority (ANAM) formerly National Institute of Renewable Natural Resources (INRENARE)
- Institute of Hydraulic and Electric Resources (IRHE)
- University of Panama
- Panamanian Association of Businessmen (APEDE)
- National Association for the Conservation of Nature (ANCON)
- Training Center for Renewable Natural Resources Management (CEMARE)
- National Forestry and Agroforestry Research and Extension Commission (CONIEFA)
- National Agriculture Technical Advisory Board (CTNA)
- NATURA Foundation
- GEA Consultants
- Program for Ecology and Management of the Kuna Yala Wildlands
- National Science and Technology Secretariat (SENACYT)
- Smithsonian Tropical Research Institute (STRI)
- National Union of Agricultural Producers of Panama (UNPAP)
- Foundation: City of Knowledge

VENEZUELA

- Ministry of Agriculture and Livestock
- Ministry of the Environment and Renewable Natural Resources
- National Experimental University "Rafael María Baralt"
- Central Western University "Lisandro Alvarado"
- Central University of Venezuela
- University of Carabobo
- National Experimental University of Guayana
- University of Zulia
- National Experimental University of the Western Plains
- University of the Andes
- National Agricultural Research Fund (FONAIAP)
- Foundation for Training and Research Applied to the Agrarian Reform (FUDECO)
- Fund for Regional development of the State of Guárico
- National Institute of National Parks
- PEQUIVEN

INTERNATIONAL AND REGIONAL STRATEGIC ALLIANCES

- CABI
- CIAT
- CARDI
- CIFOR
- ORSTOM / IRD-France
- CIRAD-France
- Earth Council
- FAO
- ICRAF
- IICA
- INIBAP
- IPGRI
- ISNAR
- IUCN
- OAS

Universities in North America and Europe:

Federal University of Bonn-Germany
University of Freiburg-Germany
University of Göttingen-Germany
University of Hohenheim-Germany
University of Bayreuth-Germany
University of Giessen -Germany
Louisiana State University-United States
University of Florida-United States
Texas A&M University-United States
Colorado State University-United States
University of Laval-Canada
University of Alberta-Canada
Wageningen Agricultural University-The Netherlands
University of Göteborg-Sweden
University of Helsinki-Finland
University of Wales -UK

- WWF-US
- Biota-Finland
- DANIDA Forestry Seed Center
- CRS-United States
- GTZ/BMZ-Germany
- INDUFOR Oy-Finland
- International Research Group-United States
- DFID-United Kingdom
- CCAD/SICA
- Formation des Ingénieurs Forestiers
- Agricultural and Veterinary Medicine
- University - Denmark
- University of Edinburg–United Kingdom

Principal Staff

As of August 1999

GENERAL DIRECTORATE

Name and Position	Academic degree and University/College	Country of origin
Rubén Guevara Moncada *Director General*	Ph.D., Economics and Natural Resources (U. Idaho) PMD, Business Administration (U. Harvard).	Honduras

Directors General Emeritus:

Gilberto Páez *Director General Emeritus*	Ph.D., Statistics/Agriculture (NCSU/USA)	Paraguay
Rodrigo Tarté *Director General Emeritus*	Ph.D., Nematology (U. Cornell)	Panama

Support Staff:

Anahí Contreras *Assistant to the Director General*	M.Sc., Ecological Tourism (ULACIT/Costa Rica)	El Salvador
Theresa White *Technical Secretary to the Board of Directors & Council of Ministers, FUNDATROPICS*	B.Sc., Administration (U. Pacific /USA)	USA

STRATEGIC PLANNING AND EXTERNAL COOPERATION

Pedro Ferreira *Director of PECE*	Ph.D., Biometrics/Agronomy (U. Waterloo, Canada)	Uruguay

Support Staff:

Tania Ammour *Head, Impact, Monitoring and Evaluation Unit*	DESS., Economics and Natural Ecosystems Management (U. Paris)	France
Henrik Hvidberg-Hansen *Coordinator of DANIDA Projects*	M.Sc., Forest Sciences (U. Copenhagen/Denmark)	Denmark

ADMINISTRATION AND FINANCES

Name and Position	Academic degree and University/College	Country of origin
Luis Enrique Ortíz *Director, Administration & Finances*	Dipl. Accounting (ESCC/Costa Rica)	Costa Rica

Accounting and Finances Area

Francisco Jamienson *Comptroller*	B.A., Business Administration (U. Costa Rica)	Costa Rica

Support Staff:

Eduardo Madrigal *General Accounting*	B.A., Business Administration (U. Costa Rica)	Costa Rica
Sergio Chacón *Budget Officer*	Dipl., Accounting (U. Costa Rica)	Costa Rica
Edgar Brenes *Projects and Agreements Officer*	Lic., Business Administration (UNED/Costa Rica)	Costa Rica

Administration Area

Luis Fdo. Coto *Chief, Administration Area*	B.A., Business Administration (UACA/Costa Rica)	Costa Rica

Support Staff:

Rodolfo Arguedas *Deputy Administrator*	Tech., Finances & Administration (U. Costa Rica)	Costa Rica
Rodrigo Coto *Head, Maintenance Unit*	Dipl., Engineering (U. San Carlos /Guatemala)	Costa Rica
Arnoldo Barrantes *Farm Administrator*	Dipl., Administration (U. Costa Rica)	Costa Rica
Alexander Chaves *Head, Purchasing Unit*	Tech., Finances & Administration (U. Costa Rica)	Costa Rica

Human Resources Area

Viviana Sánchez *Chief, Human Resources Area*	M.B.A. (National University, San Diego, California)	Costa Rica

Support Staff:

Name and Position	Academic degree and University/College	Country of origin
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Support Staff:

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Jorge Hernández *Auditing Assistant*	Lic., Business Administration (U. Costa Rica)	Costa Rica

EDUCATION PROGRAM

Juan Antonio Aguirre *Program Director*	Ph.D., Agricultural Economics (U. Cornell)	Honduras

Support Staff:

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Eduardo Molina *Administrative Assistant*	Tech., Finances & Administration (U. Costa Rica)	Costa Rica

RESEARCH PROGRAM

Name and Position	Academic degree and University/College	Country of origin
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Staff:

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Support Staff

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Ecological Agriculture Area

Elkin Bustamante *Chief, Ecological Agriculture Area*	Ph.D., Phytopathology (U. Iowa /USA)	Colombia

PLANT PROTECTION UNIT

(Vacant) *Chief of Unit*		

Staff:

Luko Hilje *Coordinator, White fly Research Network*	Ph.D., Entomology (U.C. - Davis /USA)	Costa Rica

Vera Sánchez *Chief, Plant Protection Lab*	Ph.D., Plant Pathology and Biological Control (U. Wales/U.K.)	Costa Rica

Stationed in Nicaragua

Name and Position	Academic degree and University/College	Country of origin
Falguny Guharay *Leader, CATIE-INTA/MIP Project*	Ph.D., Entomology (U. Nottingham /U.K.)	India
David Monterroso	Ph.D., Plant Pathology (Colegio Posgraduados/México)	Guatemala
Charles Staver	Ph.D., Weed Sciences (U. Cornell)	USA

Associate Staff:

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Support Staff:

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Manuel Carballo	M.Sc., Entomology and Biological Control (CATIE)	Costa Rica
Galileo Rivas	M.Sc., Plant Protection (CATIE)	El Salvador
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Fernando Ramírez	Lic., Agronomy (U. Costa Rica)	Costa Rica
Cristian Zúñiga	Lic., Agronomy (U. Costa Rica)	Costa Rica
José Francisco Fonseca	Eng., Agronomy (U. Costa Rica)	Costa Rica

Stationed in Nicaragua

Julio Monterrey	M.Sc., Entomology (CATIE)	Nicaragua

BIOTECHNOLOGY UNIT

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(ORSTOM/CATIE/IICA)		
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Antonio Mora	Lic., Agronomy (U. Costa Rica)	Costa Rica

Watershed Management and Agroforestry Area

John Beer *Chief of Area*	Ph.D., Agroforestry (U. Oxford)	Great Britain

Staff:

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Associate Staff:

Edgar Köpsell *Leader, CATIE-GTZ Agroforestry Cooperation*	Dr. Sc., Economics (U. Hohenheim /Germany)	Germany
Hans Jansen *Coordinator, CATIE/UAW-MAG Agreement*	Ph.D., Agricultural Economics (U.A. Wageningen/The Netherlands)	The Netherlands

Support Staff:

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Patricia Leandro *Head, Soils Lab; Chemical Regent*	B.Sc., Chemistry (U. Costa Rica)	Costa Rica
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Management and Conservation of Forest and Biodiversity Area

Florencia Montagnini *Chief of Area*	Ph.D., Ecology (U. Georgia)	Argentina

SILVICULTURE IN FOREST PLANTATIONS, UNIT

Francisco Mesén *Head of Unit*	Ph.D., Forest Genetics (U. Edimburgo/U.K.)	Costa Rica

Staff:

Name and Position	Academic degree and University/College	Country of origin
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Support Staff:

Jonathan Cornelius *Leader, Forest Fragmentation Genetic Effects Project (CIFOR/IPGRI)*	M.Sc., Forest Genetics and Tree Breeding (U. New Brunswick/U.K.)	Great Britain
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William Vásquez *Head, Forest Seeds Bank*	M.Sc., Forest Plantations (CATIE)	Costa Rica

BIODIVERSITY UNIT

(Vacant) *Head of Unit*		

Staff:

Daniel Marmillod	Dr. Sc., Tropical Forestry (U. Göttingen/Germany)	Switzerland

Stationed in Nicaragua

José Villa *Leader, Biodiversity and Protected Areas Management Project*	M.Sc., Protected Areas (U. Michigan)	Ecuador

Associate Staff:

Miguel Cifuentes *WWF - Regional Representative*	M.Sc., Protected Areas (CATIE)	Ecuador
Matthew Perl	M.Sc., Forest Ecology (U. Princeton /USA)	USA

Support Staff:

Name and Position	Academic degree and University/College	Country of origin
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Sandra Ramírez	M.Sc., Communications (U. Florida)	Costa Rica
Jorge Jiménez	M.Sc., Agronomy (CATIE)	Costa Rica

Stationed in Guatemala

Name and Position	Academic degree and University/College	Country of origin
Reginaldo Reyes *National Coordinator, OLAFO Project*	M.Sc., Biodiversity Management and Conservation (CATIE)	Guatemala
Francisco Moscoso *Leader, CATIE/CHIXOY Project*	Eng., Forestry (U. San Carlos /Guatemala)	Guatemala
Héctor Monroy	Dipl., Agronomy (Escuela Nacional Central de Agricultura/Guatemala)	Guatemala

Stationed in Honduras

Oscar Castillo *National Coordinator, OLAFO Project*	M.Sc. Horticulture (U. Puerto Rico)	Honduras
Adonay Castro	Lic., Social Sciences (UNAH /Honduras)	Honduras

Stationed in Nicaragua

Mirtha Gutiérrez *National Coordinator, OLAFO Project*	Lic., Agricultural Administration (UCA/Nicaragua)	Nicaragua

NATURAL FOREST MANAGEMENT, UNIT

José Joaquín Campos ***Head of Unit*** *Leader, PROSIBONA-COSUDE Project*	Ph.D., Forest Management (U. Oxford)	Costa Rica

Staff:

Name and Position	Academic degree and University/College	Country of origin
Glenn Galloway ***Leader, TRANSFORMA Project***	Ph.D., Forest Resources and Extension (U. Washington)	USA
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Bryan Finegan	Ph.D., Applied Forest Ecology (U. Cambridge/U.K)	Great Britain

Associate Staff:

Manuel Guariguata	Ph.D., Forest Ecology (U. Yale)	Venezuela
Bas T. Louman	M.Sc., Forestry (U.A. Wageningen /The Netherlands)	The Netherlands
Margareta Nilsson	M.Sc., Ecology and Extension Forest (Swedish University of Agricultural Sciences)	Sweden

Support Staff:

Juan Flores	M.Sc., Forestry (CATIE)	Honduras
Luis Fernando Jara	M.Sc., Forest Genetics (U. Wales /U.K.)	Colombia
Diego Delgado	M.Sc., Forestry (CATIE)	Costa Rica
Marlen Camacho	M.Sc., Forestry (U. Laval/Quebec)	Costa Rica
Grace Patricia Sáenz	M.Sc., Forestry (CATIE)	Costa Rica
Ana Lucrecia Guillén	Lic., Forestry (ITCR/Costa Rica)	Costa Rica
Lorena Orozco	Lic., Forestry (UNA/Costa Rica)	Costa Rica
Geoffrey Venegas	Eng., Forestry (UNA/Costa Rica)	Costa Rica
Javier Zamora	B.A., Forestry (ITCR/Costa Rica)	Costa Rica
Alvaro Chávez	B.Sc., Systems Analyst (U. Latina /Costa Rica)	Costa Rica
Víctor Madrigal	B.A., Business Administration (U. Costa Rica)	Costa Rica
Jaime Vindas	Tech., Accounting (Escuela Castro Carazo/Costa Rica)	Costa Rica

Stationed in Guatemala

Name and Position	Academic degree and University/College	Country of origin
Fernando Carrera *Leader, CATIE-CONAP Project*	M.Sc., Silviculture and Natural Forest Management (CATIE)	Guatemala
Carlos Gómez	Dipl., Forest Management and Conservation (U. San Carlos /Guatemala)	Guatemala
Gustavo Pinelo	Dipl., Forest Management and	Guatemala

	Conservation (U. San Carlos /Guatemala)	

Stationed in Honduras

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Luis Alfredo Cardona	Eng. Forestry (CURLA – UNAH/Honduras)	Honduras

Stationed in Nicaragua

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Edwin Taylor	Eng. Forestry (UNA/Nicaragua)	Nicaragua
Norman Gutiérrez	Eng. Forestry (UNA/Nicaragua)	Nicaragua

Production & Conservation Economics and Sociology, Area

(Vacant) *Chief of Area*		

Staff:

Robert R. Hearne	Ph.D., Agricultural Economics (U. Minnesota)	USA

Support Staff:

Name and Position	Academic degree and University/College	Country of origin
Manuel Gómez	M.Sc., Agricultural Economics (CATIE)	Costa Rica
Rosalba Ortíz	M.Sc., Economic Policy (UNA/Costa Rica)	Costa Rica
Cécile Fassaert	M.Sc., Agricultural Sciences-Gender & Development (U.A. Wageningen/The Netherlands)	The Netherlands
Cornelius Leonardus Prins	M.A., Law and Sociology-rural Development (U. Utreacht)	The Netherlands

OUTREACH PROGRAM

José Arze *Program Director*	M.Sc., Ecophysiology (CATIE)	Peru

Support Staff:

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Communications and Information Area

Luis Ugalde *Chief of Area*	Ph.D. Forestry, Information Specialist (U. Minnesota)	Costa Rica

Support Staff:

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Patricia Baltodano *Head, Public Relations Office*	Lic. Communications (U. Costa Rica)	Costa Rica
Eddie Salazar *Head, a.i. Computer Center*	Eng. Telematic (ITCR/Costa Rica)	Costa Rica
Elí Rodríguez *Head, Documents Production and Printing Unit*	B.Sc. Biology (U. Costa Rica)	Costa Rica
Xinia Aguilar *Editor, Forestry Journal*	M.Sc., Rural Development (Colegio Postgraduados/Mexico)	Costa Rica
Name and Position	**Academic degree and University/College**	**Country of origin**
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Laura Rodríguez *Editor, IPM Journal*	Lic., Communications (U. Costa Rica)	Costa Rica
Marcela Gil	Lic., Library and Information Sciences (U. Costa Rica)	Costa Rica
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Silvia Francis	Dipl., Graphic Design (U. Costa Rica)	Costa Rica
Douglas Asch	Tech., Finances & Administration (U. Costa Rica)	Costa Rica

Training Area

Miguel Caballero *Chief of Area*	Ph.D., Forest Economics (CSU /USA)	Mexico

Support Staff:

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Technical Cooperation and Marketing Area

Jorge Faustino *Chief of Area*	Ph.D., Land Use Planning (U. Western Pacific/USA)	Peru

Support Staff:

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Stationed in Nicaragua

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Stationed in Honduras

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Stationed in El Salvador

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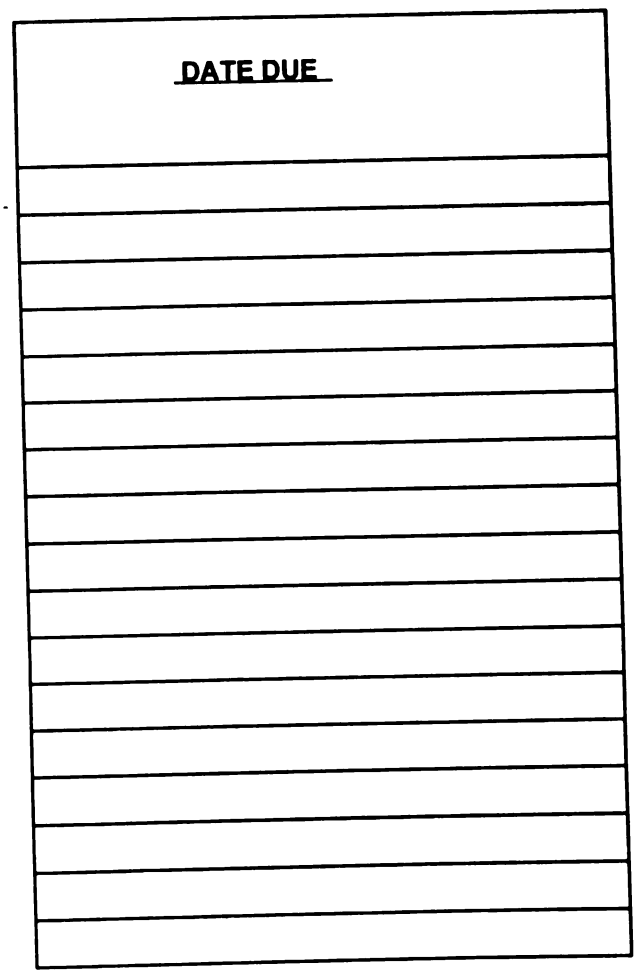
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