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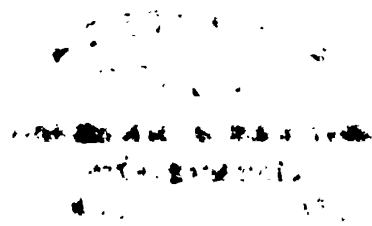
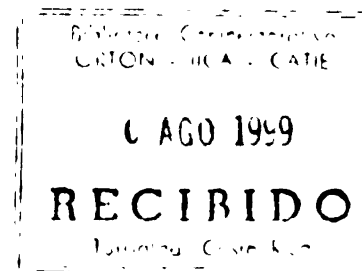
GATIE

# 1998 Annual Report

Executive Summary



Institutional Series  
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1998

# Annual Report

## Executive Summary

TROPICAL AGRICULTURAL RESEARCH AND HIGHER EDUCATION CENTER

**CATIE**

Turrialba, Costa Rica

1999

CATIE is an international, non-profit civil association, whose purpose is research and education in agricultural sciences, natural resources and related subjects in the American tropics, with emphasis on Central America and the Caribbean.



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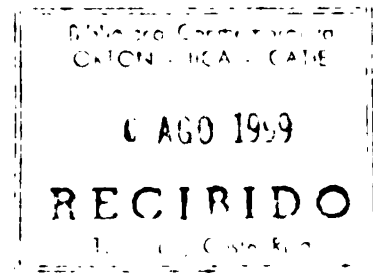
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# Annual Report Executive Summary



The efforts that, since 1995, the General Director's Office and Center Administration have made towards consolidation of the financial situation, structure and levels to which Institution programs are carried out, have borne fruit. Now, in 1998, just three years later, it can be affirmed that CATIE has significantly increased its presence in member countries, has consolidated its Education Programs and has increased its Research Program's level of fulfillment, both in quantity and quality, of set goals. In regard to financial matters, we find a most favorable situation in both the short term and mid-term, this as a result, in particular, of successful negotiations with cooperating agencies of the Swiss and German Governments as well as the Scandinavian Countries (Sweden, Denmark, Norway and Finland).

Institutional presence in member countries has been gradually consolidating. This due to various factors among which stands out the creation of the Outreach Program, the application of new policies aimed at decentralization, the creation of National Advisory Councils and the strengthening of Offices and projects within member countries national environments. Institutional participation in administration and execution of internationally financed projects within national and regional spheres has increased significantly. In this field, with the backing and cooperation of national institutions, CATIE has achieved success, first and most notably, in Guatemala and then in El Salvador and Nicaragua as shall be given to see later.

Moreover, there has been a great effort made in filling niches left "open" as a result of the successful conclusion of different regional projects the Center has led. For the aforementioned purpose, key officials from said projects have been contracted with funds obtained from core budget. Also, participation agreements from corresponding national institutions have been negotiated. The success attained by fulfilling these objectives constitutes an important achievement for it ensures continuing activity in member countries as well as the strengthening of existing technical and academic programs.

## Outreach Program

Created in 1995, the Outreach Program continued, in 1998, the consolidating of its structure, and the developing of activities aimed at the support member countries receive towards the achievement of their goals. The Program encompasses the Technical Cooperation and Marketing Areas, the Conference and Training Area, and the Communications and Information Technology Area, which, for the purpose of

implementing their respective activity have been broken down into four Outreach lines these approved by the Board of Directors and ratified by the Council of Ministers in early 1998:

- **Line 1. Promotion, Cooperation and Technical Assistance:** Seeks to actively disseminate CATIE's products and services, identify needs for new products and services, which would contribute to the enhancement of national research and development services, and to the betterment of the institution's image.
- **Line 2. Participative Validation of Technology:** Aims towards validating, demonstrating, bettering and disseminating, in a participative manner, technologies that contribute to the sustained development of agriculture and natural resources and to the promotion, coordination and monitoring of projects and national validating and development networks.
- **Line 3. On-going Formation of Human Resources Through Training and Conferences:** Hopes to better the human capital available to national research and development of agriculture and natural resources in a given region thus contributing to the betterment of the fulfillment of its goals and increasing its effectiveness and efficiency.
- **Line 4. Management and Dissemination of Information:** Compiles, integrates and distributes information produced by CATIE and others using the wide range of possibilities and strategies modern communications technology offers.

Tasks of this program are carried out, fundamentally, through cooperation and support of personnel from different technical areas of CATIE. The program facilitates the work of said personnel in these areas in the different countries and serves as a link in identifying and satisfying national needs for service.

Among tasks undertaken in 1998, taking into account the environment within which they were carried out, the following achievements are noteworthy:

## External Environment

- Aid in the reconstruction of the region. In response to the devastation brought on by Hurricane Mitch in October and November of last year, CATIE took immediate action providing first of all, humanitarian aid to ease pain and losses of the populations. With help of post-graduate students and Alumni it was possible to coordinate the shipping of 600 tons of food and clothing to (mainly) Honduras and Nicaragua. Our full support was given to the fund-raising campaign undertaken by the Honduran Embassy through which was collected approximately US\$ 82.000. On its part, CATIE raised donations amounting to US\$ 50.000, monies coming from the Governments of Sweden and Norway, out of its CATIE'S own budget and from contributions made by CATIE personnel.

After the initial impact, CATIE offered SICA Secretariat for Integration of Central America, the CCAD Central American Commission of Development and the Environment) and the governments of the hardest-hit countries, in a bilateral manner its aid and backing. Through an investment of upwards US\$ 200.000, four national meetings, one in each of the most affected countries, were held. As a result of these meetings, a regional strategy for the reconstruction of the agricultural and natural resources sectors has been elaborated.

- *Regional report "Natural Resources and Rehabilitation After Hurricane Mitch"* By request of the Swedish Cooperation Agency (SIDA) CATIE has committed itself to the elaboration of a technical report on the repercussions of the tragedy and the aspects deserving priority following the emergency. Towards this end it has called several meetings with other technical institutions and organized technical workshops in the four hardest hit countries. In consultation with CCAD and the Secretariat of the CAC, a technical report on inherent problems to be faced in the reconstruction and rehabilitation of the agricultural and natural resources sectors will be presented in 1999 for consideration by SIDA.
- *IICA-CATIE Relations.* According to the guidelines set forth by Institutional Directors, the strengthening of relations, conducive to the consolidation of our strategies and the execution of coordinated action in matters of mutual concern, has been sought. Working towards this goal, there have been two meetings held Dialogue at the Threshold I and II, where priorities for viable, timely cooperation has, as a start towards a program with a broader scope, been defined. Results have shown the potential of both Institutions, working in international cooperation towards the execution of synergic tasks that will be of still more benefit for our countries. A concrete achievement in this manner of working was joint participation, in consortium, in successfully bidding on two large projects: PAES project in El Salvador and PROSELVA project in Guatemala.
- *National Advisory Councils.* The three National Advisory Councils which have been working on a regular basis (Guatemala, El Salvador, Nicaragua), have been joined by two more: Costa Rica's, which began operations in May and Honduras' which has recently entered become active. The National Advisory Councils play an important role in each respective country by giving adequate response to the needs of each country and strengthening the institution nationally.
- *National Technical Offices.* CATIE, by request of the Government of Costa Rica, opened its fifth National Technical Office in San Jose in August 1998. Said office is located in the main building of the Ministerio de Agricultura y Ganadería (Ministry of Agriculture and Stockbreeding). The Guatemala Technical Office ,using self-generated funds, has purchased its own building in Ciudad de Guatemala. This Office ranks as the most active in administration of projects for national institutions.



## Internal Environment

- *Production of Teaching Materials.* The effort toward production during this period translates into the publication of technical manuals in agroforestry, this with the aid of GTZ as well as the publication of the book *Invertebrate Plagues of Food Crops in Central America* and the CD version of the same book among the most important.
- *Appropriation of Program Activities in the Technical Areas:* Given the matricial structure of the Institutional organization, the technical base of the Outreach Program is in technical areas: Agroforestry Systems and Watershed, Ecological Agriculture, Management and Conservation of Forests and Biodiversity, and Environmental Socioeconomics. With the aim of incorporating activity related to Outreach in each Technical Area, a strategy and an action plan, with the common denominator of complimenting technical activity and creating opportunity to bring efficient services permitting the marketing of institutional products and services has been elaborated.
- *Strengthening relations of Program personnel.* One of the activities of most importance to the program's management has been that of establishing dialogue between management and personnel. There was an initial three-day workshop, (Participation for Change I) that had as its purpose creating awareness as to the mission and vision of the Program within institutional context and what the role of each individual member is towards achieving the proposed objectives benefit of member countries, their institutions and citizens.
- *Re orientation of Institutional Magazines.* CATIE publishes three technical magazines with regional coverage: *Agroforestry of the Americas Journal*, *Central American Forestry Journal* and *Integrated Pest Management Journal*. In order to rationalize their production, a plan for the integration of editing, publishing and marketing services has been elaborated, this with the intent of lowering production costs, ultimately making them self-financing and improve their distribution and circulation in Latin America.
- *Revision of Strategic Functions and Institutional Development.* Based on existing guidelines, availability of resources and taking into account world trends, strategic functions were revised so as to elaborate a five-year plan that will serve to orient and guide future Program activity.
- *Web Page and related Data Base.* Remote users have now at their disposal a new Web Page that presents a fast-user friendly interface. However, there are problems with access to the site because the state-owned and operated communications and power company (ICE) does not, as of yet, have the adequate infrastructure in the Turrialba area. The first phase of the data base listing individuals and institutions linked to CATIE is complete and in place. Said data base will be the organizing and classifying of information about the Institution's diverse range of activities, thus achieving a higher degree of efficiency and availability to users and potential clients.



**LINE 1.  
PROMOTION,  
COOPERATION  
AND TECHNICAL  
ASSISTANCE**

This line, implemented by the Technical Cooperation and Marketing Area, has been created so as to promote and implement application and use of knowledge, information and technologies and models and systems of organization and management of agricultural and forestry production that have been developed by CATIE and other national, regional, or international institutions. At the same time, it has the function of marketing products and services that CATIE provides, assuring that these are relevant, of the highest quality and satisfy the needs of the end user, getting to these in an effective, efficient manner.

One of the most important strategies towards the marketing of products and promoting Technical Cooperation has been the creation of National Technical Offices in member countries; in countries where CATIE does not have its own office, IICA offices serve as the Institution's representative. Following are presented some notable tasks and achievements these offices have experienced:

***National Technical Offices (NTOs)***

**El Salvador.**

The National Technical Office in El Salvador has waged a vigorous campaign aimed at divulging and popularizing CATIE products and services among national and non-governmental institutions involved in the agricultural and natural resource sectors. As a result of this campaign, CATIE products are today renowned and acquired and used by about 80 institutions in the public, private, academic and NGO sectors of the country. In this campaign, more than 400 posters, 125 bulletins and 400 folders allusive to forest seed were distributed in support of the project PROSEFOR/CATIE

As part of the strategy toward development of new institutional links the following activities stand out:

- An agreement of Technical Cooperation between CATIE and the Salvadoran Environmental Fund *FONAES* has been signed with the aim of providing access to environmental funding for up to US\$ 57,000. for financing the development of annual projects
- The agreement for Technical Cooperation between CATIE and the Initiative for the Americas Fund *FIAES* has been reactivated, this aims to provide access of up to US\$ 100,000. in funding the development of annual environmental projects.
- CATIE has been linked to the project Coffee and Biodiversity, coordinated by PROCAFE, this with the purpose of obtaining up to US\$ 30,000 in funding to finance thesis work of CATIE graduate students working in areas related to objectives of this projects.



- The Consortium IICA/CATIE/CRS/UCA has been selected to develop the project Sub component of Land Conservation and Agroforestry of the Environment Program of El Salvador PAES . The project, which will be working in the high basin of the Lempa river, has received IDB financing in the amount of US\$ 8,503.772 of which US\$ 3,663,772.00 are to be used as incentives and US\$ 4,840,000 for total cost of services for a four-year period. Work on this project began in November, 1998.
- CATIE remains pre-qualified for participation in qualifying for the Sub component: Management of Protected Areas, in a PAES bid, amounting to US\$ 400,000 for a year.
- Settlement in the Initiative for the Americas Fund FIAES has been obtained by CATIE - with an "A" (excellent) rating - for the development of the project Training, Handling of Information and Extension in Support of Projects Financed by FIAES this, in the technical as well as the administrative-financial area.
- The office administers funding assigned the country for the forest seed project - PROSEFOR - US\$14,000. This project gives support to national forest tree seed banks, location and maintenance of seed grounds that have been identified as important in supplying seed having considerable commercial value.

The National Advisory Council held two regular meetings and four work meetings achieving true integration between national organizations and CATIE.

### **Guatemala**

The Guatemala Technical Office is a consolidated office, not only as it is the oldest office, but also because it is the one handling the most activity. This as a result of its administration of projects for various institutions, among these we find: MAGA, IDA, IDB, CONAP, MINFIN, IICA, SEGEPLAN y CONAMA, the funds administered exceed US\$ 4.0 million a year.

In as far as CATIE products are concerned, a high level of activity is maintained. This is reflected by the number of requests for technical assistance received and tended towards the process of restructuring the Institute of Science and Technology (ICTA) and the modernization of the Ministry of Agriculture, Livestock and Foodstuff.

In Guatemala, participation of the Technical Office has been important in the execution of many projects. Such is the case of the CHIXOY Project (MAGA/BID)", which , in 1998, surpassed expected goal achievement and acquisition of new projects through participation in public bidding such as the one for execution of the project Central Executive Unit of the Tropical Rainforest Protection Program of Peten with funding from the German Government

The National Advisory Council maintains a high degree of activity; in 1998, three regular work meetings were held were held, here the document Strategic Guidelines for

CATIE/Guatemala, was elaborated. Said document's approval is pending approval on the next meeting's agenda.

### **Nicaragua**

The promotional activity and exploration of possibilities for developing new links, carried on by the Nicaraguan National Technical Office, is highlighted by the following achievements:

- The consolidation of Agroforestry Consultantship Team of Nicaragua (*ECAN*), which brings together and binds 42 organizations.
- The elaboration of a proposal for the National Reforestation Plan (*PRONARE*). This proposal has drawn the attention of the Government of Japan that, through JICA, has destined use of U\$ 230,000 (non-reimbursable) towards the preparation by MAGFOR of pre-feasibility studies.
- Proposal for the reactivation of "La Polvosa" Experimental Center. Participating are: UCA, MAG and CATIE.
- Profile for a project aimed at modernizing the MAG's Geographic Information Systems.
- MAG endorsement for the procurement of a Phase III for *CATIE-MIP-NORAD* Project. The negotiations CATIE has held with NORAD culminated in the approval of such third phase, which will include coffee agroforestry and be regional in nature. This five-year phase will have a budget of US\$ 8 million.
- Participation in the elaboration of the National Livestock Development Program.
- Through the *CATIE/PROLEÑA* consortium, participation in bidding for the development of the project *PROLEÑA*, receiving approval, initially for the technical, pending negotiation for the economic proposal should be carried out in early 1999.
- The National Technical Office will participate in the carrying out of the *CATIE-POSAF* Project, where reforestation is the main component. This for a sum upwards of US\$ 124,000.
- CATIE has achieved involvement in the Social-Environmental and Forest Development Program (*POSAF/MARENA/BID*) through carrying out of training activities.
- In technical supervision and training tasks in connection to the reforestation project of the Río Malacatoya watershed the planting phase is considered as concluded; however still pending are training activities. The approval of financing a second phase for said project with U\$ 25,000 in 1999 is under way.

- The National Advisory Council presented moderate activity, for it held only one regular meeting and one other as a closing for Phase II of the project CATIE/INTA/MIP/NORAD, with the participation of high officials from INTA, MAGFOR, MARENA, the Embassy of Norway and organizations from the private and non-government sectors.

### **Honduras**

The Honduran Technical Office has, as of July, 1998, a new Technical Coordinator, Lic. María Eugenia Pineda, who has embarked on a vigorous promotion campaign; visiting officials in the agricultural, natural resources and environmental sectors of the country with the aim of establishing new links and exploring market possibilities of CATIE products and services.

CATIE promotional material has been sent to more than 50 institutions in the agricultural and academic sectors of the country. Specifically, brochures on training courses have been distributed along with information on Masters and Doctorate degrees offered by the CATIE Education Program.

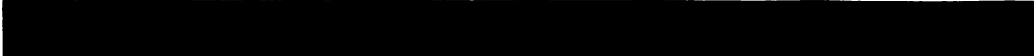
Activities have included visits to international financing agencies such as Interamerican Development Bank (IDB), El Banco Centroamericano de Integración Económica (BCIE), the Organización de los Estados Americanos (OEA), and the Programa de las Naciones Unidas para el Desarrollo (PNUD), among others, this with aim of building an awareness as to what projects these agencies are undertaking in the agricultural area and determine possibilities there are for CATIE to offer products and services through these projects.

In September a letter was addressed stating interest in participating in the bidding that Rural Areas Administration Project (PAAR) is holding for adjudication of administration of the hillsides fund for the approximate sum of US\$5.3 million.

Activities of the National Advisory Council were resumed on 7 October. The ceremony was attended by the Minister of Agriculture and Livestock, the Vice Minister of the Secretariat of the Environment, General Manager of AFE-COHDEFOR, the General Manager of the Direction Office of Science and Technology, the Assistant Manager of IHCAFE, a representative for the NGOs, a representative for the private sector and a representative for academic institutions.

### **Costa Rica**

Adhering to the outreach policy of establishing National Technical Offices in all member countries, in May, 1998, the first steps were taken towards establishing such an Office in Costa Rica. To this end, support from the Ministry of Agriculture and Livestock and the Ministry of Environment and Energy was sought. The National Advisory Council was created and duly installed and sworn in on 5 May, 1998.



The transfer of power to the new Costa Rican Government Administration has not affected, in any way, the continuity of this process. The Council has held meetings on August, October and November for a total of three in 1998.

Resulting from these meetings of the National Advisory Council, the National Technical Office, under charge of M.Sc. Arturo Vargas Fournier, has been established within the Ministry of Agriculture and Livestock compound in West San Jose. As a first achievement we can point to the signing of a covenant between the National Scholarship Fund (FONABE) towards complementing scholarships for students who enter Postgraduate School. The first three scholarship graduates are expected in the 1999-2000 graduation. Additionally, underway is negotiation for structuring new projects to be carried out jointly with the Ministry of Agriculture and Livestock; these in the fields of microwatershed management (transfer of technology and technical aid) and milk production in the lowlands (training and technology transfer project).

### **Belize**

CATIE has maintained important cooperative activities in this member country. This through technical aid missions as well as through the holding of work-meetings with officials of its counterpart institutions as well as with farmers and community leaders. Such activity has resulted in direct participation, at high decision making levels, aimed at the efficient and effective management of the country's natural resources.


This close relationship has generated methodologies and results in the management of natural resources have been obtained. These principally through the Agroforestry project CATIE-MAF. Said results are being applied to tasks developed for the management of natural resources at both government and private levels. Also Belize's participation in various cooperation networks has been reinforced, a fact that has permitted work towards strengthening research higher education, training and extension of agricultural topics. Among these networks we find REDCA and REDCAHOR,

CATIE has established a definition for areas of mutual cooperation and possible strategic alliances for the elaboration of proposals for research, education and joint development; because of this it has received the visit of important government officials of said country, including the newly appointed Ministers of Natural Resources and Agriculture.

### **Panama**

As of yet, CATIE has no National Technical Office in Panama; however, this does not mean that it isn't involved in important activities in this country. A goal set for 1999 is the formalizing of said office.

CATIE has collaborated directly in technical cooperation with and in consultantship to Panamanian institutions involved in issues of environment and management of resource in



the country through various projects that CATIE has undertaken such as OLAFO, PROSEFOR, AGROFORESTAL-GTZ, PROSIBONA and CAOBA. Results obtained from these projects are being applied by counterpart institutions in the country in other areas; a fact that implies a direct impact on technical tasks of related institutions. Also, the active participation of Panamanian institutions in various networks of specialized cooperation has been fostered and strengthened, her among others, we find the networks REDCA, REMERFI, REMSEFOR, REDCAHOR.

### **Venezuela**

CATIE has provided important collaboration to national institutions in concerns of technical cooperation and consultantship. This mostly in matters related to watersheds and planning of a National Protected Areas scheme. This has permitted the carrying out of several projects that have become models for watersheds environmental work used in other projects of this type, assimilating and applying methodologies and results obtained to their particular areas of work

Also, the Country's participation in existing technical cooperation networks, primarily REDCA, in which Venezuela occupied the presidential chair for the year 1998, has been promoted and strengthened. More than 25 government and private institutions have received document information from CATIE, information that has been employed in the preparation of their technical framework.

### **Mexico**

An important link CATIE has with Mexico is concentrated on the effort made towards the recruiting of students from said country into the Masters Program, where in fact, 8 students out of the 96 who entered the Program in 1997 and 1998 are Mexican.

There has also been important participation in training events and conferences organized by CATIE as well as third parties in Mexico. This has been achieved through technical cooperation or direct consultantship, which have provided technological schemes for rural development chiefly in areas of southern Mexico. Another important activity has had to do with the adoption and implementation of the MIRA system by government and private institution decision makers in their selection and planting of suitable species for ecosystems picked for reforestation programs.

Mexico's participation in specialized cooperation networks, such as REMERFI, REDCA y REDBIO, has been important as it has permitted horizontal cooperation and dissemination of technologies generated by the institution.

### **Dominican Republic**

CATIE has provided important technical cooperation and consultantship to private and government institutions in this country. However, as CATIE does not have a National Technical office here, this has been accomplished through the IICA Representative Office in the country, in this way, an adequate technical relationship has been maintained.

The forest seed project (PROSEFOR), has been working closely with national institutions in assuring the availability of seed of better genetic and physiological quality, it has also worked on the establishment of seed sources and the betterment of methodologies employed in seed banks thus achieving better operation of General Forestry Division and its specialized entities towards their labors on use and management of the country's forest resources.

Cooperation networks have had an important role in this work in the country through the continuing support and following CATIE has provided. Through cooperation networks such as REDCA, REMSEFOR, REDCAHOR, RIPROFITO and PROMECAFE, products and experiences have been shared, this at an institutional level as well as at an individual level on the part of members who have been able to participate in international events organized through these networks.

LINE 2:  
PARTICIPATIVE  
VALIDATION  
TECHNOLOGY

CATIE validates technology and supplies technical assistance to national institutions through various specific projects within the Technical Cooperation and Management Area. Following some outstanding examples are highlighted:

- **PROSEFOR**

The Forestry Seed Project *PROSEFOR* continued as a "bridge phase" to negotiate Phase II, which has been approved, for a period of three years, as of July, 1998, by DANIDA. The project is being carried out in the Dominican Republic, Guatemala and Panama. It has, as its main objective, the strengthening of forestry development in the seven member countries, assuring the availability of seed of better genetic and physiological quality.

The project continued its support to the goal of accelerating the technical management of the already selected 310 seed sources and towards the strengthening of forest seed banks in member countries. Two training events were held in each of the following countries: El Salvador, Nicaragua and Costa Rica, events where approximately 95 professionals received training in management of seed sources and the gathering and handling of seed. Also, so as to strengthen relationships with national institutions, and ensure their backing in carrying out and follow up of planned activities, more than 50 technical assistance visits were made. Support of National Network of Seed Producers and Technical Groups and Regional Network of Forestry Seed *REMSEFOR* continues.

- **OLAFO**

Between January and June, 1998 there was a "bridge phase" of the project OLAFO, which had been in operation since 1989. As of July, the project continues in countries financed by DANIDA: Honduras (3 years), Guatemala (2 years) and Nicaragua (1 year); at Headquarters, the incorporation of lines of work and technicians for the project into CATIE's permanent structure continues (Phasing in).

The projects main activities were focused on defining and initiating transfer of functions to the institutions counterparts in the different countries, something that implied a important number of tasks directed at defining, ratifying and initiating the carrying out of commitments made by institutions involved (Centro Maya/MAGA in Guatemala, PNDR, MARENA/DEMAC, MEDEPESCA in Nicaragua, COATLAH and AFE-COHDEFOR in Honduras).

The projection, at a national institution level, implies the involvement of high Ministry authorities in support of: the process of granting community concession in Petén-Guatemala, work with municipalities in the national environment (Honduras), and implementation of strategies for organizing (Nicaragua).

Nicaragua's "Cooperativa 28 de Julio" became the first group to implement a forest management plan in a mangrove forest. In a parallel manner, in Guatemala, the San Miguel and La Pasadita community concessions were ranked by the Smartwood evaluation committee during the assessment process for forestry certification as organizations capable of good forest management. (project support CATIE/CONAP).

- **TRANSFORMA**

In Honduras, its work is carried out in the north seaboard and la Mosquitia, and in Nicaragua in the "Región Autónoma Atlántica Norte y Río San Juan" (Autonomous North Atlantic and Rio San Juan Region).

At Demonstration Areas a camp was built at AMO Toncontín Camp (operative management area), near La Ceiba, Honduras (inaugurated 6 October). Here at AMO, community involvement was validated through their participation in an exhibit and interactive workshop setting a model for better exploitation of resources which included directed tree felling and use of a chainsaw mill to process lumber.

An agreement was signed with the company "Maderas y Derivados de Nicaragua S.A. (MADENSA)" (Lumber and Derivatives) for its cooperation with the undertaking and with the indigene community "Comunidad Indígena Awas Tingni (Mayagna/Sumo)" for the establishing of an AMO in an industrial concession of 42,000 hectare at RAAN, Nicaragua.

A workshop was held with the Indigene Federation of the de Mocerón and Segovia Zone FINZMOS to redirect work at la Mosquitia.

There were 19 training, promotion and extension activities for technicians, forest workers, direct beneficiaries and civil society in which 656 people from three networks participated (REMBLAH, REMARIO, REMAB-RAAN).

Two document centers have begun preliminary operation in Honduras and three in Nicaragua and the ESNACIFOR Library.



- **MAYA BIOSPHER PROJECT CONAP/CATIE:**

The CONAP/CATIE project is a cooperative effort provided by CATIE to the National Council of Protected Areas CONAP with the aim of consolidating the forest concession system in the multiple-use zone of the Reserve of the Maya Biosphere, Petén, Guatemala. Tasks are being carried out with funding from US-IDA. Some of the most notable achievements in 1998 were:

The elaboration and approval on the part of CONAP of a faster and assured norm for the granting of Management Units under the legal auspice of the Concession for the Exploitation and Management of Concessions of the Maya Biosphere.

The accepting of new community groups for participation in the forestry concession program in the Maya Biosphere Reserve.

The structuring and putting into work in Petén a Geographic Information System (GIS) to facilitate the development of the Concession Program and other Control and monitoring activities in the region. It must be pointed out that the support of the GSI in fighting forest fires in Petén this year has been notable.

More than 100 persons have participated in the different training courses aimed at elevating the levels of technical knowledge of CONAP personnel working in Petén (technicians and resource guards) as well as personnel from other partner institutions in the process of community concessions.

Thanks to the support in the process of marketing and commercializing products, it has been possible for a community group to exploit, industrialize (through community-industry integration) and export its lumber production to the international market substantially incrementing the income received by the community.

International recognition for work achieved has been highlighted by the forestry certification or Green Seal granted for good concession management.


- **IPM-INTA/CATIE PROJECT**

With NORAD support, CATIE is developing a broad project on Integrated Pest Management with Headquarters in Nicaragua.

In the period 1995-98 this project put to work the massive multiplication of methods and experiences that had been developed during the project's first phase (1989-94).

During 1998 (January-July), which marked the last months of Phase II, the work was organized into different activities aimed at systematizing experiences and increasing and increasing the sustainability of advances in the project. There were 52 training and





evaluation events held with participation of 1260 men and 391 women from different institutions. Project specialists combined their efforts with 51 national technicians and 250 farmers to carry out tasks in a participative research environment in 10 different locations through Nicaragua, generating technologies, and detecting gaps in knowledge in order to better plan future tasks. So as to strengthen the capacity of specialists from different institutions, 48 work sessions with 17 inter-institutional groups were held with the participation of 150 specialists and national decision-makers. To share learning from the current phase and incorporate this in the work perspectives of future tasks, 54 bilateral and multilateral meetings were held with different institutions. Phase II of the project concluded in July, 1998.

In August, 1998, NORAD approved financing for "A Regional participative Implementation Program on Integrated Pest Management and Agroforestry of Coffee in Nicaragua and Central America". This new program undertaken by CATIE in coordination with several regional and national institutions will permit the continuation of the task of strengthening national capabilities in the region during the years 1998-2003 so that implementation of the MIP and Coffee Agroforestry will reach rural families.

- **FIAES/CATIE PROJECT**

In El Salvador, technical assistance was provided to 20 NGOs involved in environmental projects backed by the Fund for Agricultural Investment of El Salvador *FIAES*. There were three tours held with farmers; 42 men and 3 women, a total of 45 participants.

Support material on such topics as folios of forest nurseries; establishment and management of forestry and agroforestry plantations; living fences; land conservation and gathering and management of forest seed was elaborated and reproduced for the NGOs.

The project came to its conclusion with a rating of "A" (excellent) both in technical and administrative aspects.

## NETWORKS

For CATIE, Networks represent one of the most important opportunities to project its activity in specific fields and an instrument for providing important support to national institutions. The principal Networks in which CATIE has participation and their most important function is presented following:

- **REDCA**

REDCA is a network of institutions of higher Education and research in member countries, and has, as its fundamental purpose, the academic and scientific strengthening of its

member institutions through horizontal cooperation. At present there are more than 130 institutions affiliated to REDCA and each country has a duly organized National Chapter. This network has received financial backing from the Government of the Netherlands through the "Strengthening of Institutions of Higher Education, Research and Development" Program as well as from CATIE's basic budget.

In 1998 five workshops were held in Venezuela, Guatemala, Dominican Republic, Panama and Costa Rica. This activity was principally aimed at the strengthening of teacher and investigator knowledge on specific topics. Due to the emergency brought on by Hurricane "Mitch", the Network's General Assembly and related events programmed to take place in El Salvador in November 1998 were suspended and reprogrammed for 1999.

#### **Mesoamerican Plant Genetics Resource Network (REMERFI)**

The main objective is to promote the conservation, management and sustainable use of autochthon germoplasm in the Mesoamerican Region. This Network is presently sponsored by the Inter American Development Bank (IDB) and by GTZ (Germany).

The geographic coverage is Mexico, Central America and Panama. CATIE participated actively in training and technology dissemination activities.

#### **Central American Forestry and Agroforestry Network (RIBRENAC)**


The network objectives are to facilitate access to regional forestry information and to assure that forestry extensionists have access to technical information to disseminate to farmers. It has Regional geographic coverage. CATIE is in charge of the Control Center (Orton Memorial Library) which coordinates and carries out Network operation (technically, financially, and administratively).

#### **Mesoamerican Forest Seed Network (REMSEFOR)**

The objectives are to support and strengthen the continuous and timely storage of reproductive forest material of high genetic and physiological quality for the different reforestation projects through grouping regional farmers, merchants, and forest seed users. It is sponsored by CATIE through funding provided by DANIDA. CATIE performs two important functions in the Network: a) Work assessment and giving material support to the organization; b) financial support.

#### **Iberoamerican Plant-based Pharmaceutical Products Network (RIPROFITO)**

The objective is to promote the cooperation between the sectors involved in order to facilitate harvesting and conservation of native Iberoamerican plants in order to benefit the public. It is sponsored by CITED (Iberoamerican Science and Technology Development Program). This organization in turn receives funds from the various national governments and the Spanish government. The Network also carries out self-supporting projects. The



geographic coverage is Latin America and Spain. (CITED was started with Spanish funding). 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.

#### **Integrated Pest Management Network (IPM)**

The objective is to strengthen the procedures and ability to carry out field and laboratory diagnostics and identification of pests that affect the principal regional crop plants. Geographic coverage is Guatemala, El Salvador, Honduras, Costa Rica, and Panama. CATIE is responsible for the regional project coordination. This has had a definite influence in the Network's orientation and historical development.

#### **Regional Cooperative Program for the Technological Development and Modernization of Coffee Culture (PROMECAFE)**

The objective is to develop research and the application on new technologies, which contribute, to the modernization of regional coffee cultivation. It is sponsored by Inter American Institute for Agricultural Cooperation (IICA) and funds are provided by the Coffee Institutes in the agreement's member countries. Geographic coverage includes Mexico, El Salvador, Honduras, Nicaragua, Costa Rica, the Dominican Republic and Jamaica. CATIE participates in the Coffee Genetic Improvement Project. Production work is done on selected material through conventional improvement. In addition, a biotechnological component is involved that includes clonal micropropagation, large-scale multiplication, and behavior and mass diffusion trials in countries, which are members of PROMECAFE. CATIE's genetic germoplasm resources are also evaluated through Molecular Biological techniques.

#### **Technical Cooperation on Vegetable Biotechnology Network (REDBIO)**

The main objectives are 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 and to foster the development of cooperative projects within Regional laboratories and centers of excellence worldwide. Network is sponsored by the United Nations Food and Agriculture Organization (FAO). Geographic coverage is Latin America and the Caribbean. CATIE coordinates Central American activities through the Biotechnology Unit.

**LINE 3. On-going  
Formation of  
Human Resources  
Through Training  
and Conferences**

The Training Area carries out a fundamental activity towards institutional development and has become one of the fundamental instruments of Outreach, for annually these draw participation of several thousand technicians, farmers and decision makers of the region who depend on CATIE to provide them with the latest, up to date knowledge and information available.

For this reason, in 1998, an exhaustive evaluation of strategic courses was undertaken and the Committee of Training Coordinators approved a work plan that adjusted and updated courses, canceling those that were no longer relevant or useful. Also, in 1998 a new scheme of training, employing strategic alliances with national institutions, principally through REDCA, was launched. A first successful experience came about as a result of the contracting by INTA, Nicaragua for a series of courses that CATIE has provided with the participation of institutions linked to REDCA – Costa Rica, such as the National University, State University at Distance and Central American School of Livestock this so as to offer training that CATIE does not have adequate strengths in, but in which it has mediated as facilitator in order to answer the needs of other national institutions.

The importance of CATIE Training Program is demonstrated in the following Tables illustrating results of events held in member countries, Headquarters and elsewhere.

**Table 1. Training Events held by CATIE in Member Countries and Turrialba in 1998.**

PLACE	EVENTS (Number)	DURATION (days)	NUMBER OF PARTICIPANTS		
			Men	Women	Total
Member Countries	188	670	3350	928	4278
Turrialba	50	410	547	345	892
Other Countries	8	19	209	50	259
<b>TOTAL</b>	<b>246</b>	<b>1099</b>	<b>4106</b>	<b>1323</b>	<b>5429</b>

In Table 2, following, are presented training events according to the type of event.

**Table 2. Distribution of Training Events according to type of event.**

TYPE OF EVENT	NUMBER OF EVENTS	DURATION (days)	PARTICIPANTS		
			Men	Women	Total
In Service Training	17	159	115	37	152
Special Courses	64	365	1045	302	1347
Strategic Courses	12	245	145	26	171
Field Days	46	65	1025	123	1148
Workshops	87	245	1425	615	2040
Conferences	12	12	188	117	305
Forums	1	1	65	50	115
Seminars	7	7	98	53	151
<b>TOTAL</b>	<b>246</b>	<b>1099</b>	<b>4106</b>	<b>1323</b>	<b>5429</b>

Other relevant information on the training events is shown on Table 3 that highlights their distribution among the countries where these were held, which illustrates the institutional effort towards moving activity out of the Headquarters.

**Table 3. Distribution of Training Events by country**

COUNTRY	NUMBER OF EVENTS	DURATION (days)	PARTICIPANTS		
			Men	Women	Total
Belize	3	111	38	2	40
Costa Rica	46	171	569	323	892
El Salvador	9	9	249	29	278
Nicaragua	60	130	325	65	390
Panama	35	95	928	185	1113
Honduras	28	120	767	235	1002
Guatemala	4	18	86	37	123
Mexico	3	16	388	52	440
CATIE	50	410	547	345	892
Other Countries	8	19	209	50	259
<b>TOTAL</b>	<b>246</b>	<b>1099</b>	<b>4106</b>	<b>1323</b>	<b>5429</b>

Finally, where training events are concerned, it is important to mention the topic(s) dealt with; this follows in Table 4.

**Table 4. Training Events according to topic of Technical Area dealt with.**

AREA or UNIT	NUMBER OF EVENTS	DURATION (days)	PARTICIPANTS		
			Men	Women	Total
Agroforestry	114	497	1687	465	2152
Protected Areas	8	130	97	50	147
Biotechnology	2	13	15	15	30
GTZ	3	10	31	25	56
Tech. Com. Sys.	3	42	23	13	36
PROSEFOR	11	53	128	24	152
Silviculture	25	160	521	250	771
Phytoprotection	60	107	1325	414	1739
Watershed Management	3	10	68	11	79
Olafo	13	42	164	44	208
Tropical Agricult.	1	3	20	6	26
External Projectn.	3	32	27	6	33
<b>TOTAL</b>	<b>246</b>	<b>1099</b>	<b>4106</b>	<b>1323</b>	<b>5429</b>

**LINE 4.  
Management and  
Dissemination of  
Information**

This line is handled through the Communications and Information Areas that make up the Computer and Information Technology, Media Production, Library and Public Relations Units. Following, are presented noteworthy achievements of each:

**Computer and Information Technology Unit**

In August, 1998, a new SUN server was installed. This unit, dedicated to financial and administrative applications, will satisfy the demand for more information services and users bettering performance by up to 10 -15 times of what it was.

In June the "backbone" of the CATIE WEB began operating at 100 Megabytes per second (Fast-Ethernet Technology). Formerly, we worked at 10 Megabytes per second.

After the "reconstruction" phase, CATIE WEB went "on line" on 1 September, 1998.

The new data base BRI Institutional Relations DataBase operates the modules People, Organizations, Listings of Subscribers to Publications and Technical Cooperation. The latter provides information on donors. Also, a listing events module in which CATIE participates in next to going into operation.

**Technical Journals**

**a. Integrated Pest Management Journal**

The MIP-Journal, published quarterly, first made its appearance in 1986, having brought to light 51 editions to date. Its aim is that of serving as an information link with technicians, extensionists, and farmers with an interest in pest management and diseases on the maincrops in the region. Some achievements of the group in charge of this publication during the year 1998 are presented below

- A Cooperation Agreement was established with IICA's Collaborative Network of Garden Vegetables research towards the publication in the magazine advances they have made as well as to produce a short bulletin from the Network.
- Preparation of the book *Invertebrate Plagues of Annual Food Crops in Central America* by Dr. Saunders *et. al.* was concluded. Work has been done on the multimedia version of the book, which is being produced by Universidad de Colima, Mexico.
- There was collaboration on the publication of two technical books and two items of material destined for farmers.



**b. Agroforestry of the Americas Journal**

The journal "*Agroforestería de las Américas*" is published since August, 1994, and the 22 editions of this magazine that have been produced aim to provide technicians, extensionists and farmers with interests in all form of agroforestry with continental coverage.

A total of 5000 copies were distributed in different parts of the world. In 1998, 3800 copies were sold. The rest of this distribution is on base of exchange and donation.

Based on a 1997 evaluation, DANIDA will provide financing for an additional three years; also, the NAC has supported RAFA economically.

In 1998, ICRAF (International Center for Research in Agroforestry) went from its former role as patron to sponsorship of the magazine, their interest is due to, that through the magazine, some of their publications and news reach Spanish speaking populations.

**c. Central American Forestry Journal**

The Journal "*Revista Forestal Centroamericana*" has, since 1992, when it was first published, provided through 25 issues to date, coverage in the area of regional forestry for those technicians, extensionists and farmer interested in its many modalities.

The latest editions (numbers 20-23) with some very diverse timely topics such as: criteria for sustainable forest management; globalization and the planning of natural resources; methodologies for the evaluation of protected areas; genus; industrial application for new species; environmental impact of forest plantations; financing of forest plantations; forest fires; community forest concessions; rural knowledge – among many others. These editions have counted on participation of 32 authors and co-authors.

Gradually the magazine has incremented its earnings to the point that it has achieved financial auto-sufficiency something reflected by its 1998 revenue which amounted to US\$15,800 in sales and advertising. Approximately 3,000 copies have been distributed, this not taking into account 700 data base subscriptions.

**Orton Memorial Library**

The Orton Memorial Library, administered and managed jointly with the "*Instituto de Cooperación para la Agricultura (IIICA)*" (Institute for Agricultural Cooperation) continues being one of the most valuable instruments for the disseminating of knowledge at a regional, continental, and global level. The volume of its activity reflects this, some relevant numbers are presented following:

- 532 editions of books and magazines were acquired through direct purchase and 1.167 through donation and exchange.
- 970 new entries were inserted into the Orton database; presently there are 65.970 entries.
- 6.854 documents went on loan and the needs of 5.491 users who visited the Library were tended to. Additionally, 141 bibliographies on specific topics were distributed to users in different countries, while *in situ* users carried out approximately 3.450 searches. The Orton database, accessible through Internet registered 412 accesses.
- 437 books were sold and 438 documents were distributed.
- Recommendations, emanating from internal auditing and external evaluation carried out in, aimed at betterment procedures and automated processes have been implemented.
- Incorporation of the REVIS database on Internet.

## Public Relations Unit

The Public Relations Unit has as its main function the disseminating of activities carried out by CATIE to the national and international community. In this role of producing material for divulging information it elaborated, during this period, 24 press releases distributed to the press, radio and television as well as to international news agencies. Contact with the television media was maintained with the following news programs and their corresponding channel ("canal"): Telenoticias of Canal 7, NC4 of Canal 4, Noticias Repretel of Canal 6, Esta Mañana of Canal 6, Noticiero Univisión of Canal 2 y Enfoque 13 of Canal 13. Contact with international news agencies was maintained with: Bridge News, ACAN-EFE, NOTIMEX, France Presse, Inter Press Service (IPS), Reuter, DPA y Noticiero ECO.

As for publications for the press, Table 5 presents the distribution of the 47 publications released in 1998.



**Table 5. Publication on various institutional topics accomplished in 1998 in different media.**

<b>PUBLICATION</b>	<b>Number of publications</b>
Tico Times	1
El Financiero	1
La Jornada	2
Cartago en La Nación	2
La República	3
Turrialba Hoy	3
La Nación	4
Cartago Al Día	8
Nuestro Agro, La República	11
Tribuna Turrialbeña	12
<b>TOTAL</b>	<b>47</b>

There was also an important effort made for radio dissemination of various institutional aspects including from newscasts and reports to programs directed to farmers, this is shown in Table 6.

**Table 6. Radio Dissemination of aspects of institutional interest in 1998.**

<b>RADIO STATION</b>	<b>Number of Broadcasts</b>
Noticias Radio Monumental	24
Radio Reloj, Radioperiódico	24
Radio Reloj, Costa Rica Campesina	24
Noticieros Columbia	24
Radio Atlántida, Turrialba y sus Noticias	24
<b>TOTAL</b>	<b>120</b>

## ACADEMIC ACTIVITIES

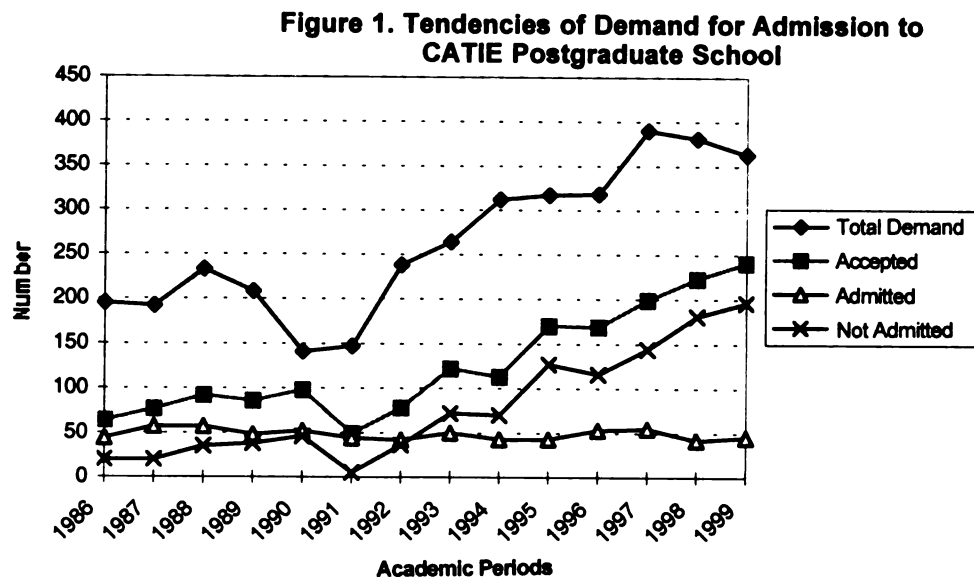
The Education for Development Program aims to develop in postgraduate students a strong base of knowledge as well as a critical, innovative attitude that will permit them to contribute in an optimum manner to the betterment of production and conservation processes of a region's natural resources. The Program has been modeled on the principle: "Produce conserving and conserve producing" which is the institutional motto established in its Strategic Plan.

The Postgraduate School works in base of two fundamental programs: The Masters Program and the Doctoral Program. The latter, begun in 1996 has demanded great effort on the part of the institution towards the achieving of its gradual consolidation.

### Masters Program

CATIE's Masters program began in 1946, at the time under the administration of the "Instituto Interamericano de Ciencias Agrícolas" (Interamerican Institute of Agricultural Sciences), the Program graduated its first student in July, 1947. Now, after 52 years of uninterrupted activity, the Graduate School can boast more than 1,400 alumni who are now professionals working in the field of agriculture and natural resources in Latin America, the Caribbean and other parts of the globe. The prestige the CATIE Postgraduate School enjoys is renown and highly value throughout the American Continent.

Figure 1 shows historic behavior since 1986 of the total demand for admission to CATIE Graduate studies as well as: number of applicants accepted, number rejected and number admitted.



As Can be inferred from the preceding figure, the number of students applying to the Graduate School has significantly increased this last decade, reaching approximately 400 applicants a year. An analysis of the situation lets us see that the most limiting factor in as far as tending to this voluminous demand is the availability of scholarship funding. Although the institution has bee aware of and has focused on the problem, it has not been

possible to find a satisfactory solution. In fact, only through a growing investment on the part of CATIE has it been possible in the last few years to maintain the student levels the institution is geared for, the aforementioned investment comes to check the diminishing scholarships granted by various sources.

In the last four years (from 1996 to 1999), 192 students have been admitted into the program, the great majority of these through total or partial financing by CATIE. Other agencies such as Danida, DAAD, Government of Holland, COSUDE, NORAD, Government of England, GTZ/BMZ, etc. have supported this effort, but this has not tended the problem, resulting in the Institutions potential not being exploited.

The geographic coverage has maintained its natural tendency in the last years, with primarily, participation of students coming from CATIE member countries, but with important participation of students from the rest of the continent. However, participation of students from the Caribbean continues low, this is possibly due to language barriers, an aspect on which the Center has focused attention in the last years with its goal of becoming a bilingual Center. It is for this reason that students in the Program are required, during their two year course of study, to attend an on-going language course in English as well as to undergo a final evaluation of proficiency in this language administered by an independent agency (to date The British Institute). Table 7 gives us a break down of students and their countries of origin for the last two graduating classes.

**Table 7. Students and their countries of origin in the period: 1997-1998**

<b>Country</b>	<b>Number of Students</b>	<b>Country</b>	<b>Number of Students</b>
Argentina	4	Mexico	8
Belize	2	Mozambique	1
Bolivia	5	Nicaragua	10
Brazil	5	Panama	1
Colombia	10	Paraguay	1
Costa Rica	11	Dominican Rep.	2
Ecuador	3	Uruguay	1
El Salvador	11	Venezuela	5
Guatemala	6		
Honduras	10	<b>TOTAL</b>	<b>96</b>

The Education Program for CATIE masters students is directed toward four main areas: Ecological Agriculture, , Agroforestry Systems, Environmental Economics and Forest and Biodiversity Management. Within these Areas the individual can orient his studies toward one or another specialty, this principally through research work that leads to their thesis.

On the average, a total of 55 courses are offered. In these courses a grade of 80/100 is required as a passing mark. The Grade Point Average over the past three years has been 87.6 something that points to good academic achievement on the part of our student. The

quality of courses is evaluated as well, empowering the school and professors to maintain a constant goal for improvement. For this student opinion is the most important parameter. Using the same 100-point scale, students have ranked courses and faculty with an average grade of 86.4 in the last years.

One of the most important achievements that has been coming into consolidation these past few years is the disposition that all students at the school be considered research Assistant and that their thesis work be linked with specific lines of research defined in the Research Program, which focuses on aspects of regional priority. In this manner, the 53 thesis papers presented by 1998 graduates fulfilled this requirement.

## Doctoral Studies

The CATIE Doctoral Studies (Ph.D.) Program began in March, 1996 as a joint program with universities in the U.S. and Europe. Presently the Program is offered in areas of specialization such as Tropical Forestry, Tropical Agroforestry Systems and Tropical Agriculture.

The plan of study for this Program is individual and is prepared by through agreement between the student, his mentor and the respective cooperating university.

CATIE has come to agreements that permit collaboration in postgraduate study with several universities. Towards this plan the following universities have cooperated so far: The University of Göttingen (Germany), Colorado State University (USA) and The University of Florida (USA) where it is expected a student will begin coursing his studies in 1999.

Other agreements have been signed with the Universities of Hohenheim y Freiburg (Germany), Louisiana State (USA) and Texas A&M (USA) more recently; however, there is as of yet no student who has begun his first year of study at these centers. It should be pointed out that these last agreements have been much more advantageous, mainly in aspects of payment for services.

The program has had a relatively high demand for in three years it has received almost 100 applications with rather interesting geographic coverage, for beside applicants from Latin American countries, there has been interest from students coming from European and African nations. Most of the applications received have been from Mexico, Costa Rica, Dominican Republic, Colombia and Brazil. Of the applications received and processed, 37 candidates have been accepted and five have been admitted.

As in the Masters Program, the most significant factor holding back the development of the Doctorate Program has been the Obtaining of scholarships to support the Program's high cost. As to this aspect, two of our present students received scholarships from DAAD (Germany) covering their first year of study at Göttingen and to the four students who have returned CATIE has offered contracts as Research Assistants with this they will earn enough to cover tuition costs as well as have a modest stipend for living expenses; however they



are bound, by contracted obligation, to work in the Research the Area they work is involved

During 1998 the Doctorate Committee was organized and all program activities were normalized. The committee is presided by the Director of the Education Program and members include the Center Director, Director of Research and three Faculty Members.

There is a consultancy scheduled for early 1999 where an external expert will objectively evaluate the Doctorate Program and put forth pertinent recommendations towards its consolidation.

## RESEARCH ACTIVITIES

CATIE's Research Program has as its broad objective the *"Contributing to the wellbeing of the people of the tropics through the generating and validating of technologies for agricultural production and management of renewable natural resources that are economically feasible, socially and culturally acceptable and environmentally sustainable"*.

The program has specific objectives related to the increase of knowledge on biophysical, ecologic and socio-economic mechanisms and the dynamics of a variety of production systems and their components. Also, it seeks the betterment of technologies and management of systems for the integration of sustainable agriculture with the management and conservation of natural resources.

In order to achieve these objectives, and after a period of study, reflection and consulting with member countries, five lines of research were defined and in which CATIE has relatively important comparative advantages as well as the human and economic resources to meet the challenge of providing answers to the needs of member countries were given priority. These lines are:

1. Improving and conserving the germoplasm of selected crops and forest species.
2. Integrated pest management in agroforestry and forestry systems.
3. Agroforestry systems for hillside land, agricultural frontiers and degraded soils.
4. Developing technologies for the sustainable managing of forests and their biodiversity.
5. Economic analysis and evaluation of policies on the management of goods and services of tropical ecosystems.

Each of the above lines is subdivided into several sub-lines and within the latter are worked the projects and specific tasks. Table 8 shows the number of projects underway in 1998 within each line of investigation.

**Table 8. Investigation Projects underway in 1998, according to the line of investigation.**

<b>Line of Investigation</b>	<b>No. of Projects underway</b>
1. Genetic Resources	14
2. Pest Management	17
3. Agroforestry Systems	11
4. Forestry and Biodiversity	17
5. Economy and Sociology	8
<b>TOTAL</b>	<b>67</b>

The Research Program is coordinated by an eight member Scientific Committee, among them the Center's General Director, the Director of the Research Program, who Presides, the Director of the Education Program and the five coordinators of each research line. This Scientific Committee coordinates and sets priorities in general research activity, it also defines mid-term policies in planning investigation strategies as well as coordinating the financing of such research activities. Finally, it evaluates quality and the impact of the research.

Institute personnel involved in research activities in different Areas is composed of the five Area heads, 32 professionals holding Doctorate Degrees, 33 with Masters Degrees, 15 with a Licenciature and 80 research Assistants, among these we find graduate students who are working on their Masters Degrees in the Graduate School.

Table 9 presents the number of scientific and technical publications produced by CATIE researchers in 1998. It must be pointed out that in the last two years the Center has maintained a very acceptable number of publications, around 30, in high level scientific journals with an editorial committee, and that the number of these publications that have been featured in the Science Citation Index has been on the increase: from 7 in 1996, to 16 and 20 in 1997 and 1998, respectively.

**Table 9. Publications and presentations by CATIE investigators in 1998, according to publication and line of investigation.**

<b>TYPE / LINE</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>TOTAL</b>
<b>Magazines</b>						
International Scientific Journals	7	4	5	11	3	30
Regional Technical Journals	10	12	24	4	3	53
<b>Others</b>						
Books/Chapters in books	4	2	3	4	2	42
Documents in Proceedings	5	12	3	14	9	43
Abstracts and Others	7	11	3	14	9	44
<b>TECHNICAL</b>						
Technical Series (CATIE)	1	2	4	4	1	12
<b>GENERAL</b>						
Articles/bulletins	28	1	-	14	1	44
Progress Reports	5	1	-	2	-	8
<b>ACADEMIC</b>						
Course Material	-	-	3	-	-	3
M.Sc. Thesis	7	7	14	8	17	53
<b>TOTALS</b>	<b>74</b>	<b>52</b>	<b>90</b>	<b>73</b>	<b>43</b>	<b>332</b>

The macro-goals that were set for the Research Program in 1997 for 1998 were reached. These were: to define with precision research projects in each line and sub-line, consolidate the research-education link so as to have the topics of student thesis work in concordance with priority topics on said research lines and sub-lines achieving, in this manner, new funding for research work in areas of priority (new projects for the approximate sum of US \$ 2 million were acquired) and to better conditions, infrastructure, and human capacity to carry out investigation work. In respect to this last mentioned goal the Research Technical Support Unit *UTAI*, which began operation in January, 1998, was created. The achievements of this new Unit are highlighted following:

#### **Research Technical Support Unit UTAI**

This Unit was created late in 1997 with the objective of centralizing the services of all the institution's laboratories and experimental farms and fields so as to establish a horizontal line of service tender for all three CATIE Programs: Research, Education and Outreach. Another objective was to try to maximize the efficient use of available economic and human resources in laboratories and promote a better utilization of equipment. As a third objective, but not one of any less importance, the unit was charged with the responsibility and task of the effective management and disposal of contaminating and/or dangerous wastes that all laboratories of this sort generate and discard, this task has as its objective eliminating or minimizing pollution of the environment.

During 1998 this Unit's functions were given priority on institutional budgets and with the full backing of the General Direction the Unit achieved some very important goals. Six laboratories ( Sub-Unit of Statistics, Biotechnology, Fertility and Soils, Animal Nutrition, Plant-protection and Geographic Information Systems) and three experimental fields (La Montaña, La Lola y Cabiria) came to depend , administratively, on UTAI.

The Unit's most important achievements were:

- a. Experimental farms were subject to a thorough maintenance program eliminating weeds and scrub in empty lots.
- b. Annual work plans for the Cabiria farm, where chiefly, phylotechnical resources are housed and for the La Lola farm were the planting of 1 hectare of heart of palm (palmito) was contemplated.
- c. Each of the collections in the Cabiria y La Lola farms, as well as the experiments in La Montaña were labeled and identified through the use of visible plaques.
- d. All technicians and lab assistants received two training courses: " Occupational Health and Environmental Protection" and Storage and Handling of Hazardous Substances in Laboratories".
- e. The Soils Laboratory was totally remodeled.
- f. A new Root Laboratory was constructed in the Agroforestry Area for studies this Area carries out in this field.
- g. Important maintenance and remodeling work was done in the Phyloprotection Laboratory.
- h. The Biotechnology laboratory was expanded and remodeled so as to provide more facilities to the Laboratories of Crioconservation and Molecular Biology, which operate jointly.
- i. The Geographic Information Laboratory was backed in purchases of new software and images.



## OUTSTANDING RESEARCH RESULTS DURING 1998

In previous annual reports, research results have been presented according to technical areas. However, when CATIE's research lines were defined, various studies overlapped into two technical areas. Now, these fall within a single research line. In this report results will be presented according to research lines instead of technical areas.

### Line 1. Improvement and conservation of germplasm of selected agricultural and forest species.

- **Plant regeneration by direct sowing of *Coffea arabica* somatic embryos 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<sup>™</sup>). The development of the directly planted embryos into plants was highly successful when the embryos were germinated. 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 sacrose 234mM) two weeks before planting stimulated an efficient development of the embryos to plants (78%) and vigorous plant growth in regenerated plants. In addition, the direct planting reduced the labor hours by 13% and the *in vitro* culture area by 6.3% with respect to the values obtained by the conventional acclimatization method of plants cultured in gel media.

- **Criopreservation 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 work, an existent protocol of cryopreservation was optimized for its efficiency in embryogenic cell 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 process of the protocol was modified: crystallization induction, pretreatment conditions, cellular recuperation, and pregrowth treatment with sucrose and lactose. The optimized protocol was applied in embryogenic cell suspensions of *Musa* and four out of five cultivars withstood cryopreservation (Dominico, SF 265; Currare 3; and Col 49 2.8.)

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

Cacao plants require a long time to reach maturity when the most 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.

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

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

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

Mahogany (*Swietenia macrophylla*) is one of the most valuable timber species in the world. It originated in Tropical America including Central America, whereby due to its overexploitation during the last 30 years, many of its natural populations have been subsequently 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.

Polymorphisms generated through the RAPDs analysis were used for the estimation of the genetic variability. A greater genetic diversity was detected within the provenances than among them. This was corroborated using 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 both groups have different origins or evolutions. The results were compared with a previous study of the progenitors to estimate the effect of forest fragmentation over the progeny, suggesting that in the case of the provenance of Costa Rica and Panama, forest fragmentation had affected their genetic diversity. Five quantitative variables were evaluated: plant height, root collar diameter, aerial dry matter, root dry matter, and the aerial dry matter/root dry matter ratio. The

quantitative study showed 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 heredability.

- **Characterization of 97 sweet pepper (*Capsicum* spp.) accessions in the CATIE collection**

The objective of this research was to characterize 97 *Capsicum* sp accessions of from CATIE's 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 to show significance with the country of origin and specie. The discriminate value from 70 characters obtained a 46 with highest discriminate value, 32 qualitative (significance at 1% by the  $X^2$  test) and 8 quantitative characters were selected by the "D" Engels Index. The agro-morphological characterization showed phenotypic variation, and gave value to the conserved germplasm and made it available to research programs.

- ***In situ* conservation of beans (*Phaseolus vulgaris*) on producers' farms in Cajamarca, Perú**

In Peru, activities related to develop agrodiversity *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 for the maintenance of bean genetic diversity on farms. In this sense, following an anthropological approach, the present study seeks to support this initiative continuing the research on the identification of the principal reasons for which farmers conserve bean mixtures. As a result of interviews, it was seen that half of the farmers still cultivate mixtures, use different types of bean seeds and recognize agronomic advantages such as disease resistance, good yields and precocity. However, there is a general trend in the group of farmers to abandon mixtures due to other factors that influence their conservation, such as economical aspects, grain quality and seed availability. In this manner, the genetic homogenization in beans is occurring through a selection process oriented by consumer criteria and related to aesthetic characteristics, such as white grain color and taste.

## **Line 2. Integrated pest management in agroforestry and forestry systems**

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

Results of biocontrol 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 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 decrease severity of plant diseases caused by geminivirus, *Pseudomonas solanacearum*, and *Phytophthora infestans* in tomato; *Mycosphaerella fijiensis* in banana and *Rosellinia bunodes* in coffee trees. Promising results were obtained in all cases both under greenhouse and field conditions. Plant growth of coffee, tomato and *Musa* spp was improved when nematode-infested soils were treated with endomycorrhizic 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 been proven against different species of *Phyllophaga* which is of great importance in Central American agriculture for its crop damaging potential.

- **Efficacy of live ground covers for the management of white flies (*Bemisia tabaci*) en tomatoes (*Lycopersicon esculentum*)**

Efficacy of living ground covers for managing *Bemisia tabaci* as a geminivirus vector in tomatoes was studied. 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-year field data on transplanting tomatoes have shown that two living ground covers associated with the crop, either "cinquillo" (*Drymaria cordata*, Caryophyllaceae) or coriander (*Coriandrum sativum*, Umbelliferae), significantly reduce whitefly adult numbers, delay geminivirus dissemination, decrease disease severity, and 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-feeding effects of some plant extracts on *Hypsipyla grandella* (zeller) larvae**

The inhibitory effect of some plant extracts on the mahogany shoot borer's (*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 randomized 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 randomized 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 did not show activity as either anti-feedants nor growth regulators. Laboratory bioassays with increasing concentrations (0,1, 0,316, 1,0, 3,162 and 10%) of each extract confirmed the antifeeding activity of both bitterwood extracts, as well as that of common rue foliage.

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

The effects of fungicides on growth and germination of *Beauveria bassiana* were evaluated under laboratory conditions. Results showed that the fungicides Benlate, Curzate, Acrobat, Daconil, Antracol and Dithane have an inhibitory effect over the fungi's germination and growth. The fungicides Aliette, Previcur and Kocide did not significantly affect the growth and the germination of the fungus.

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

This study evaluated ten treatments, which included six plant growth-promoting and resistance-inducing microorganisms, one organic amendment, two micorrhizic 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 increase leaf area and plant height. In the second stage, the treatment with bocashi was again the one which had the greatest increases in growth variables. However, *Pseudomonas fluorescens* and *Trichoderma harzianum* also achieved good results. *P. fluorescens* was able to significantly decrease the disease's severity.

- **Mycorrhizal fungi: an option for *Meloidogyne exigua* management in coffee (*Coffea arabica*).**

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 were studied. Both mycorrhizal fungi decrease the multiplication rate of *M. exigua* and the gall index. The plants' foliar area and dry weight were greater with *Gigaspora*.

- **Mycorrhizas and compost: alternatives for the ecological management of *Radopholus similis* in banana (*Musa* spp.).**

This study was carried out to evaluate three endomycorrhizal fungi and one organic amendment and their effects on the growth of banana plants from *in vitro* culture as well as their biocontrol properties on *Radopholus similis*. The endomycorrhizal fungi were *Glomus occultum*, *Entrophospora colombiana* and *Gigaspora margarita*. The compost utilized as an organic amendment increased the water content and significantly improved plant growth. The symbiosis encouraged tolerance to *R. similis* through the compensation for damage caused by nematodes and increased plant nutrition absorption. The endomycorrhizae provoked significant modification in cellular morphology.

- **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 is discussed. During the first phase of this research, native pathogens with potential as biological 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-dosis of the herbicide haloxifop, demonstrated potential as control agents of *R. cochinchinensis*.

- **Participative implementation of IPM in different coffee-producing areas in Nicaragua**

The CATIE/INTA IPM Project in Nicaragua collaborated with national institutions, the national coffee organization, and NGOs to develop a participatory model for the widespread multiplication of coffee IPM techniques with farmers, extensionists, and specialists.

The project team first worked with ten groups of coffee growers to field-test a participatory training sequence at key crop stages. Simple methods were developed for training about 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 bi-monthly during the year to strengthen their communication 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.

### **Line 3. Tropical agroforestry systems for hillsides, agricultural frontiers and degraded lands**

- **Ecological contribution of forage tree tannins on bovine (*Bos taurus*) nitrogen use**

This study was conducted on CATIE's experimental farm in Turrialba, Costa Rica to determine the effect of feeding forages of contrasting tannin concentrations on N utilization by 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<sup>-1</sup>) than *C. sepium*. As the level of *C. calothyrsus* increased, N intake decreased, fecal N increased, urinary N, N retained and N absorbed decreased whereas the use efficiency of absorbed N increased. The use of a mixtures of forages 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 monocrop 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 of 2500 mm and temperature 27 °C; soils are acid with high Al saturation), to determine the effect of the *Acacia mangium* timber tree on the productivity and quality of *Brachiaria humidicola* pastures. Treatments included: 1) *B. humidicola* monoculture; and 2) *B. humidicola* in mixture with *A. mangium*. The forage had significantly lower crude protein concentration (32 vs 46 g kg<sup>-1</sup>) and solubility (52 vs 58%) in the monoculture vs the mixture, respectively. Mean total forage yields of the mixture were 28% higher than those for the monoculture. In the dry season, dead pasture biomass represented 60% of total dry matter measured in the grass monoculture whereas it was only 30% for the mixture. The leaf: stem ratio of *B. humidicola* was higher for the mixture. It is concluded that the integration of *A. mangium* in silvopastoral systems with *B. humidicola* contributed to increased pasture yield of higher nutritive value.

- **Quantification of stored carbon in a silvopastoral system in the Atlantic Zone of Costa Rica**

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 Typic Tropofluvent soil stored 233 t C ha<sup>-1</sup> 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<sup>-1</sup>. C concentrations decreased with soil depth and distance from the tree. Variability of C distribution increased with soil depth and age of the stand.

- **Capacity of nitrogen-fixing trees to supply nutrients to maize (*Zea mays*) 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 manures; 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 of 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 contents, elements in which these soils were seriously deficient.

- **Green manures as a nutrient source in tropical hillside agroecosystems 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* Ò *Mucuna deerengianum* Ò *Mucuna pruriens* var. Brunin Ò *Tithonia diversifolia* = *Canavalia brasiliensis* Ò *M. pruriens* var. Tlalt Ò *M. pruriens* var. IITA Ò *Cratylia argenta*. The rice received the highest quantities of N from: *M. deerengianum*, *M. pruriens* var. Brunin, *T. diversifolia* and *C. brasiliensis*. These materials also had N content and higher levels of *in vitro* digestibility and lower lignine/N and lignine + poliphenoles)/N ratios.

- **Timber species for shade in new and old cacao (*Theobroma cacao*) 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.


- **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 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 30 cm nearest the surface where the most absorbent coffee roots are found, avoids plant death due to hydric stress.

- **Productivity, labor and variable costs of organic versus conventional coffee smallholdings in Costa Rica**

Productivity, labor, variable and priority costs, limitations and 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 compared to the organic group. Nevertheless, five organic farms had higher production than their conventional partners. 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 introduction of timber trees in their coffee (*Coffea arabica*) plantations**

Farmers in Perez Zeledon, Costa Rica have a clear preference for *Eucalyptus deglupta*, *Terminalia amazonia* and *T. ivorensis* as timber species used as shade in their coffee fields. *Gmelina arborea* was identified as the least advantageous species. Their preferences were based mainly on ease of tree management and their effects on the coffee. Farmers believe that the reforestation program in coffee fields with timber trees using incentives have a forestry focus which 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**

The study was conducted in Grecia, Costa Rica through the use of surveys and interviews with farmers and growth measurements of timber trees used in coffee fields. The most important limiting factor found was inappropriate planting density of 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 inaccurate planting recommendations, tree growth was better on 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 grass species *Panicum maximum* Jacq. (Var. CIAT 16061) and *Brachiaria humidicola* Rendle (Var. CIAT 679) in monoculture or in association with *Centrosema macrocarpum* (Benth). There were five levels of mulch addition: none; *Erythrina poeppigiana* (Walp.) O.F. Cook (138 g pot<sup>-1</sup>) to give 150 kg N ha<sup>-1</sup>; *E. poeppigiana* (276 g pot<sup>-1</sup>) to give 300 kg N ha<sup>-1</sup>; *Acacia mangium* Will. (86 g pot<sup>-1</sup>) to give 150 kg N ha<sup>-1</sup> and *A. mangium* (173 g pot<sup>-1</sup>) to give 300 kg N ha<sup>-1</sup>. 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 over the control. *C. macrocarpum* had a positive effect.

- **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 radicular 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 species of trees 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.

## Line 4. Development of technologies for sustainable management of forests and their biodiversity

- **Advances in the domestication of *Vochysia guatemalensis***

*Vochysia guatemalensis* Sm., J.D. is a fast-growing timber tree, found naturally in the wet lowlands from southern Mexico to Panama, usually forming pure stands. Due to its fast growth and good stem form, it is being increasingly planted, mainly in Costa Rica. During the last ten years, CATIE has implemented a number of activities aimed at the domestication of this species. These include selection of trees, 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. In addition, field tests have 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 to recognize forest owners' contribution in protecting forest services. A law passed in 1996 established the financial and institutional mechanisms to implement this payment system in private farms to protect and manage 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. Besides, the study integrated evaluations from different sectors (scientific and land owners) in order to facilitate decision-making process 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) in two tropical rain forest sites in the Caribbean lowlands of Costa Rica that had been selectively logged but that differ in their degree of protection from human intrusion (primarily due to hunting) and habitat connectivity were evaluated. Differences in rates of seed removal and the fate of removed seeds were expected between sites, and it was predicted that secondary seed dispersal rates by mammals would be highest at the protected site. Patterns of seed removal under two protection treatments (semipermeable cages vs. uncaged) varied both within species across sites and within sites across species, suggesting site differences in the abundance of vertebrate seed consumers. However, differences were largely species specific. For all species combined, twice as many seeds were dispersed after 50 days of

observation at La Selva. Evidence was found for differential seed survival in the study of species between sites, probably related to altered mammal community composition, resulting from hunting pressure and loss of habitat connectivity at Tirimbina with respect to La Selva.

- **Effects of de-vitalization of trees through silvicultural treatments without using arboricides in broadleaf rain forests**

Following the proposal of an operational technical framework for forestry management, this states 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 de-vitalization, 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 means a 90% de-vitalization.

- **Technological elements for the silviculture of *Quassia amara* 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 at CATIE. In Costa Rica the species is found below 450 m.a.s.l. in areas where soils maintain their humidity all year round. Populations are denser in sunny areas, whereas in very rainy places, 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 related to topographic and light conditions. Shrubs produce flowers and fruits under all light conditions, but more intensively and during longer periods for shrubs with greater basal diameter (> 65 mm) and intermediate light exposure (20-80 % of tree tops receiving direct vertical light). Higher light exposure levels did not produce significant changes, but rather a tendency to decrease. Maximum averages were 1112 flowers and 135 fruits per shrub up until 180 phenological activity days. Topographic conditions had no effect on phenology but affected annual diametric increase; this was greater 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 maximum light exposure (4.14 mm). Illumination control appears to be a fundamental factor for species integration in diversified forest management.

- **Response of *Carludovica palmata* at different leaf harvesting 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 levels (0, 50 and 100%) in plants from one size category were practiced. These treatments were conducted monthly over an eight-month period. The effects of the treatments on growth and fruiting of the plants, production and dimensions of new spear leaves were evaluated.

There were significant differences of 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, there was a significant effect of the treatments on 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 fruits were present and the lowest was before April. It is recommended that leaf harvest should be carried out during the months of June to September, during the highest leaf production in order to harvest bigger individuals.

- **Natural regeneration in pure and mixed native species plantations**

Natural regeneration and understory light availability was measured in two plantations in 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 diminish grass growth and thus encourage woody invasion under the species' canopies.

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

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 was 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. Productivity at the end of the rotation varied between 10.2 and 13.3 m<sup>3</sup>/ha/year, yielding a total volume of 270 to 380 m<sup>3</sup>/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<sup>3</sup>/ha, and an annual productivity rate of 9.0 to 11.3 m<sup>3</sup>/ha/year.

- **Accumulation of carbon 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. We 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* had the highest levels of carbon accumulation (40.2 Mg C ha<sup>-1</sup>) followed by *Jacaranda copaia* (40.1 Mg C ha<sup>-1</sup>) and the four-species mixed stands (39.0 Mg C ha<sup>-1</sup>). In Plantation 2, the mixed plantations and *Dipteryx panamensis* (19.9 and 19.57 Mg C ha<sup>-1</sup>) had the highest carbon accumulation. In Plantation 3, *Hyeronima alchorneoides* had the highest values (15.8 Mg C ha<sup>-1</sup>) followed by *V. ferruginea* (13.4 Mg C ha<sup>-1</sup>) and the four-species mixture (11.4 Mg C ha<sup>-1</sup>). 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 information interchange, and to create networks between researchers, projects, companies, countries or regions.

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

*Vochysia guatemalensis*, *Vochysia ferruginea* and *Virola koschnyi* are species from the humid tropical forest, which grow at elevations below 800 masl along the Atlantic coast of Central America. All three species are becoming increasingly important for reforestation, but there is a lack of information on the seed requirements for storage and germination. The present experiments were carried out in the laboratory of CATIE's Tree Seed Bank 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 the seeds of *V. guatemalensis* and *V. ferruginea* are desiccation tolerant. *V. ferruginea* reached 93% germination after drying to 6.4% moisture content and *V. guatemalensis* reached 96% germination after drying to 5.9% moisture content. *V. koschnyi* does not tolerate desiccation below 20% of moisture content.

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

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 in relation to the distribution of hurricane impact, extreme substrate moisture regimens and local variations in their conditions. 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 in relation to soil types or physiological units.

## **Line 5. Socioeconomic analysis and valuation of policies, and environmental goods and services from tropical ecosystems**

- **Two case studies of the adoption of tree planting systems on farms in Central America**

This article presents results of recent studies of the adoption of on-farm tree plantings, one on the Pacific coast of Guatemala and the other in an agricultural community near the capital city of Costa Rica. Both studies used interviews of participants and non-participants carrying out regression and logistical analyses of factors influencing the

decision of farmers to engage in tree planting programs. The studies found that: a) area planted was positively related to total farm area; b) in Costa Rica, tree plantings most commonly replaced pastures; c) in Guatemala minimal subsidies for resource-poor farmers were often required even though the systems were financially profitable; d) perception of financial profitability was one of the most important, if not the most important consideration in engaging in on-farm tree planting; and e) technical assistance and farm visits had a significant impact on the decision to plant trees on farms.

- **The application of RAAKS in the Piedras Blancas National Park, Costa Rica**


This study presented an application of the RAAKS (Rapid Appraisal of Agricultural Knowledge Systems) methodology in "Piedras Blancas", National Park in the Osa Conservation Area of Costa Rica. By applying interviews, participant observation, and community workshops the functioning of local Information and Knowledge Systems related with communities' problems was studied from a participatory perspective. Even though, villagers living conditions have become worse since the creation of the National Park, conservation interests of the local habitants and the Park administration are compatible.

- **Analysis of the reforestation incentive programs implemented in Costa Rica**

Incentive programs to promote reforestation in Costa Rica have operated since 1979, with an investment of US\$156 million (constant 1990 dollars) and the establishment of 152,000 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 forest research to producers. On the other hand, the financial and economic analysis of the plantations of *Gmelina arborea*, *Tectona grandis* and *Bombacopsis quinatum* show that the amount of the incentives represent a higher social cost than the benefits generated by carbon storage.

- **The balance of carbon and its economic value in the sub-humid 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 carbon 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.

- **The application of multiple choice experiments in the payment distribution for environmental services in Costa Rica's forests**

This document presents survey results from the initial stages of a multiple 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 the 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 exotic species as an indicator.

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

The way in which carbon sink services of forest ecosystems are perceived is an important issue in the political agenda of Climate Change. This is even more true when the relationship between carbon stock and flux is not absolutely clear in terms of climate change, mitigation problems and those economic values.

This document 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.



**Table 10. Average biomass accumulation ( $\text{Mg ha}^{-1}$ ), stored carbon ( $\text{MgC ha}^{-1}$ ) and fixed carbon ( $\text{MgC ha}^{-1} \text{ a}^{-1}$ ) in forest ecosystems and their values**

Forest Ecosystem	Average rate of fixation ( $\text{MgC ha}^{-1} \text{ a}^{-1}$ ) (a)	Average biomass per hectare ( $\text{Mg ha}^{-1}$ ) (b)	Stored Carbon ( $\text{MgC ha}^{-1}$ ) (c) = (b)*0.45	Value of $\text{MgC}$ = \$US10 (Costa Rican negotiation price) d=(c)*10	Value in terms of $\text{CO}_2$ mitigation (\$154US/ $\text{MgC ha}^{-1}$ ); e=(a)*154
Primary forest <b>Control farms (Costa Rica)</b>	0.83	117.6	67.9	679	127.8
<b>Altered primary forest, Canopy Protector (Costa Rica)</b>	0.21	121.3	54.5	540,5	32.34
<b>Altered primary forest in Lomerío (Bolivia)</b>	1.04	153.6	69.1	690	160.16
<b>Secondary forest (Costa Rica)</b>	2,5	150	52	520	385
<b>Plantations (Chile)</b>	2.8	144.5	65	650	431.2
<b>Plantations (Costa Rica)</b>	4	..	..	..	616

Source: Data taken from case studies carried out through CATIE's Economics Area.

## STRATEGIC PLANNING AND EXTERNAL COOPERATION

During 1998 external cooperation activities centered around institutional relations with governments, cooperation agencies and institutes, in the negotiation of donations and contributions to CATIE's core budget. This included the elaboration and negotiation of projects, as well as institutional agreements and participation in bids and consultancies.

Strategic planning activities included follow-up and implementation of the Institutional Development Plan and the revision and re-programming of individual work plans for the Center's Principal Professional staff. An in-depth revision of CATIE's Strategic Plan was also undertaken. This activity ended with the approval of the Plan by the Board of Directors and the Council of Ministers. Finally, individual works plans for 1999 were revised and approved for Principal Professional staff, and an evaluation was made of their performance during 1998.

Several countries and institutions made significant contributions toward the development of research, education and outreach activities that CATIE executed during 1998. Among donor countries, contributions were received from Denmark, Sweden, Norway, The Netherlands, Switzerland, Germany, France and the United States of America. These contributions totaled approximately US\$8.5 million, and can be seen in detail in Table 11.

**Table 11. Contributions to research, education and outreach activities at CATIE by country/institution**

COUNTRY	INSTITUTION	CONTRIBUTION
		Amount US\$
Canada	IDRC, CIDA	24,275
Denmark	DANIDA	1,686,726
France	MAE, ORSTOM y CIRAD	4,700
Germany	GTZ, BMZ	296,577
The Netherlands	Ministry of Foreign Affairs., UAW	379,010
Norway	NORAD	544,333
FUNDATROPICOS	FUNDATROPICOS	98,600
Sweden	SIDA	1,249,895
Switzerland	COSUDE	1,170,678
United Kingdom	ODA, NRI	317,039
United States	AID, USDA, ACRI	907,115
Other institutions	IADB, FAO, WWF, IPGRI, CIFOR, European Community	1,360,874
<b>TOTAL</b>		<b>\$8,039,822</b>

The negotiation of new projects, which is the most important institutional activity undertaken to ensure the continuity of activities in the coming years, was highly successful in 1998. Forty-six new projects were approved, for a total of approximately US\$20 million. The signing of these projects and the significant total amount negotiated are clear evidence of the trust of CATIE's donors in the institution. The most important donors are COSUDE, SIDA, DANIDA, NORAD, NRI, ACRI, USDA, CIAT and CIFOR, to whom CATIE is extremely grateful for their interest in activities to develop the region.

The Center has participated in various bids and tenders in its Member Countries. For example CATIE, in a consortium with IICA-CRS-UCA won a bid to receive funds from the IDB to manage a watershed in the Lempa River region of El Salvador. This is part of that country's Environmental Program. In Nicaragua, the Center is formulating a strategy to increase fuelwood sources and improve energy efficiency in the Pacific region through the PROLENA consortium. In Guatemala CATIE participated in bids for the Sustainable Development Program in Peten (IDB) and PROSELVA (KFW from Germany). In both cases, the results were positive. These activities enable CATIE to improve its institutional presence in the region, and open up possibilities to offer technical assistance and technology transfer.

Another important aspect within the Strategic Planning Office was the great number of institutional agreements signed (23) between CATIE and diverse institutions within and outside the region, to meet the countries' needs. These agreements are a clear indicator of the interest, trust and excellent institutional image that CATIE has among national and international institutions, with whom it conducts activities of mutual interest within the Center's mandate

Finally, contributions that CATIE receives as counterpart support from its different strategic allies, mainly in the form of human resources, must be pointed out. Table 12 below summarizes these contributions during the past two years.

**Table 12. Counterpart contributions of strategic allies during the period 1997-1998, in US\$ thousands**

<b>INSTITUTIONS</b>	<b>1997</b>	<b>1998</b>
CIRAD-France	600	600
IPGRI/INIBAP	249	250
NRI-United Kingdom	180	75
COSUDE-Switzerland	100	100
GTZ-Germany	250	180
UA Wageningen-The Netherlands	70	70
DGIS-The Netherlands	200	200
MAE-France	80	80
WWF-United States	250	250
ORSTOM-France	200	200
FINNIDA-Finland	50	—
ICRAF	30	30
CIFOR	300	300
UICN	40	40
Laval Univ./Univ of Alberta-CIID	40	20
Univ. of Vet. Medicine-Denmark	40	—
DANIDA-Denmark	200	200
CIM	150	150
SIDA-Göteborg	200	125
USDA	—	30
University of Idaho	—	20
Gilberto Páez	—	100
<b>TOTALS</b>	<b>3229</b>	<b>3020</b>

## FINANCIAL SITUATION

The Center's financial situation during 1998 was stable, and the income and expenditures budget approved for this period was executed satisfactorily, as can be seen in Table 13 of this report. At the end of 1998, an adequate accountable operative reserve was obtained to finance activities at the beginning of 1999.


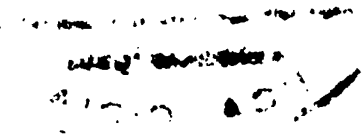
**Table 13. Income and Expenditures at CATIE during 1998 in US Dollars (US\$).**

INCOME / EXPENDITURES	US\$
<b>INCOME</b>	
Membership fees	1,795,275
Technical support services	351,429
Academic activities	529,453
Productive activities	1,856,366
Logistic and administrative support	768,208
Exchange differences	- 34,127
Other income	262,890
Specific contributions and donations	2,257,802
Funds in custody	1,225,715
<b>Sub total</b>	<b>9,013,011</b>
Projects	6,279,196
<b>TOTAL INCOME</b>	<b>15,292,207</b>
<b>EXPENDITURES</b>	
Administration and support	1,771,412
Technical programs	4,338,100
Productive activities	1,196,020
Funds in custody	1,225,715
<b>Sub total</b>	<b>8,531,247</b>
Projects	6,279,196
<b>TOTAL EXPENDITURES</b>	<b>14,810,443</b>
<b>INCOME – EXPENDITURES (surplus)</b>	<b>481,764</b>

One important point that stands out is the agreement signed by representatives from the Permanent Workers Committee (CPT), representing CATIE's national personnel. This agreement allowed the Center to pay off all severance rights of its employees accrued to December 31, 1998. Costa Rica's Ministry of Labor praised CATIE for this agreement which solved two important problems:

- a) All severance pay accrued, up to a maximum of eight years was paid out to national employees based on the most recent salary. The difference was financed by CATIE and covered all back pay.

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- 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, it guarantees that a monthly deposit (1/12 of the salary) of each employee will be deposited beginning in 1999. This portion corresponds to the worker's severance pay and forms part of the employer expenses. It can be reported as a legitimate cost in the Center's budget.

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

Through this agreement, employees agreed to a change in the regulations regarding vacation days, in the sense that employees with the most seniority, who had 30 working days of vacation leave, presently will have 15 days. New employees will accrue 15 days after having worked for 52 consecutive weeks. This represents a significant savings in time and contracting for temporary workers in those cases where the employee had the right to 30 working days of vacation.

Among productive activities conducted at CATIE, the most important of these is the sale of housing and hotel services, which produced income for approximately US\$350,000 during 1998. The second most important income of this type comes from production on CATIE's farms, for nearly US\$172,000. It must be mentioned, however, that low income from sugarcane sales was due to a decrease in international prices and to some production problems. The third most important productive activity at the Center came from sales of transportation services that contributed approximately US\$44,000.

## CONCLUSIONS

- At the end of 1998, the financial situation at CATIE and its perspectives are satisfactory. Efforts made to ensure that this trend continues during the coming years have been fruitful, mainly considering the amount of already negotiated financing for future execution.
- CATIE's institutional presence in its Member Countries is increasingly relevant. Besides growth in regional project activities, the National Technical Offices and National Advisory Councils have been consolidated as highly effective permanent mechanisms.
- Since its creation in 1996, the Outreach Program has continued to consolidate its activities making it an important pillar in the justification of the Center's existence in Member Countries.
- The Research Program has consolidated the projects to be executed within its five priority Research Lines. This in turn has helped to create unity between it and the Education Program. This consolidation will increase the Program's strength and consolidate its relevance.
- The quality and quantity of research conducted at the Center has increased. This is reflected in the number of publications produced as well as in the number of these published in top rate scientific journals, and in the increase of their appearance in the Science Citation Index.
- CATIE has shown its technical response capacity to the consequences of natural phenomena that periodically affect the region. Numerous requests for technical assistance have been filled, and a technical dialog on the effects and rehabilitation after Hurricane Mitch have been initiated.
- European support to CATIE has been consolidated, with the approval of large financial contributions such as those through projects including MIP/NORAD, support from DANIDA to different projects, creation of a second Chair funded by COSUDE and the continuation of the GTZ-Agroforestry project. It is also important to mention substantial contributions to CATIE's core budget by Sweden, Denmark and Norway.







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