



Solutions for environment and development
Soluciones para el ambiente y desarrollo

Annual Report 2019



An aerial photograph of the CATIE campus, featuring a large, light-colored building with a red roof situated on a hillside. In the foreground, there is a large, circular pond surrounded by lush green trees and a paved path. The background shows more of the campus and surrounding forested hills.

Maintaining CATIE's foundational spirit in times of change

In 1973, CATIE (Tropical Agricultural Research and Higher Education Center) was established as an autonomous entity dedicated to research, higher education and outreach activities.

Since then, CATIE has maintained its unique focus on integrating higher education and holistic research that has led to new approaches, including agroforestry and silvopastoral systems for sustainable agriculture and livestock, model forests, forest concessions, the blue economy and ecosystem services. In the coming years, priority will be given to CATIE's recognition as an international academic center, with the pre-eminence of an international university. This will allow us to ensure that its founding spirit, with which it operates to date, is maintained.

2019 was a year of challenges, opportunities and achievements in all our areas of work. In this report, we present the actions developed by the Center to support the countries of the region in finding the solutions they need to achieve sustainable and inclusive development.

Muhammad Ibrahim
Director General of CATIE



CATIE AT A GLANCE

**Stories that make a
difference**

Towards a circular economy in local governments of Costa Rica

The circular economy generates 1.1% of gross domestic product (GDP) worldwide, being an alternative to the linear economy. For this reason, in 2019, the Municipality of Turrialba in Costa Rica, the Institute for Municipal Development and Advisory Services (IFAM) and the Ministry of Environment and Energy (MINAE) signed a letter of understanding for the implementation of a project to have circular economies in local governments. This project will be financed by the Climate Technology Network (CTCN) and implemented through CATIE. The project aims to incorporate the circular economy approach into municipal planning frameworks, promote more sustainable consumption patterns, improve solid waste management and reduce total CO2 emissions in local governments, specifically in the city of Turrialba; thus contributing to the country's goal of achieving more sustainable and carbon neutral development. With this initiative, CATIE maintains its commitment to continue working with municipalities and local partners to promote innovations in their economies and the transition towards sustainable production models in the framework of a green, circular and efficient economy. In this context, CATIE has an important role to play in generating knowledge and strengthening capacities at different levels.

Mr. Carlos Manuel Rodríguez, Minister of Environment and Energy of Costa Rica, said:

“This initiative represents an excellent opportunity to complement, from the local governments, what the country has been doing at the macro level in order to facilitate a transition to a circular economy. At the macro level this concept is positioned with decision makers and structures have been developed to facilitate its implementation. We must then start to close the gap with a bottom-up approach. This initiative will give a dose of political reality to the processes developed at the macro level. I also consider it very important that academia, international cooperation and local governments work in an alliance to strengthen the process by which we aspire to move towards a green-circular economy.”



The future of coffee and cocoa is safeguarded at CATIE

For more than 70 years, international coffee and cocoa collections have conserved genetic resources that have made it possible to improve existing coffee and cocoa varieties. For several decades, CATIE, together with various partners, have been conducting research using the genetic wealth that exists in the collections and they have managed to generate six new varieties of cocoa and F1 hybrids of coffee with characteristics such as disease tolerance, ability to adapt to various climate and soil conditions, high productivity and excellent quality.

The new cocoa and coffee materials have been successfully disseminated to cocoa and coffee growing families in Central America and Mexico, contributing to the increased productivity and sustainability of the crops, as well as the income of the producing families. These actions generate economic and social well-being while conserving biodiversity and ecosystem services through the agroforestry systems that are formed from these crops.

The International Cocoa Collection began in 1944 with materials introduced from 25 different countries, including Ghana, Brazil, Belize, Colombia, Honduras, Ecuador, Indonesia, Trinidad and Tobago, Cameroon and Malaysia.

It currently has 1,235 accessions and was declared one of the two most important international cocoa collections in the world by the United Nations Food and Agriculture Organization (FAO). It is also a central part of the global strategy for the conservation and use of cocoa genetic resources promoted by Bioversity International.

The International Coffee Collection began in 1949 with materials introduced from Brazil, Guatemala and El Salvador. Later, wild *Coffea arabica* materials were brought in from Ethiopia, Kenya and Yemen, collected by the United Nations Food and Agriculture Organization (FAO), the French Scientific Research Institute for Development Cooperation (ORSTOM, today IRD), and the International Plant Genetic Resources Institute (IPGRI).



This coffee collection, composed of around 2000 varieties, is the fourth largest in the world and the most important collection of *Coffea arabica* in the Americas, both in terms of the number of varieties and the genetic diversity it conserves. It is considered one of the four collections of origin in the world, according to the Global Strategy for the Conservation of Coffee Genetic Resources developed by the Global Crop Diversity Trust and WORLD COFFEE RESEARCH (WCR). Both collections are in the public domain and since their creation they have supported the genetic improvement programs of many countries around the world, offering opportunities to produce differentiated chocolates and coffees that are healthier, have better quality, and innovative flavors.

Over the years, CATIE has had the support of important partners for the maintenance of the collections and the development of research, including PROMECAFE, the Costa Rican Coffee Institute (ICAFE), GAIA Coffee, Cafetalera Orígenes, San Francisco Bay Coffee, the PROCAGICA Programme (of the INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE and the European Union), Crop Trust, WCR, the Centre for International Cooperation in Agronomic Research for Development (CIRAD) Starbucks, the Fine Coffee Association of Costa Rica, Nestlé, Mars, Bioersivity International, WORLD COCOA FOUNDATION (WCF), the Ministry of Agriculture and Livestock of Costa Rica (MAG), the National Institute for Agricultural Innovation and Technology Transfer (INTA), Korean Cooperation for Food and Agriculture in Latin America (KoLFACI), the United States Department of Agriculture (USDA) and FAO.



A regional strategy for climate change adaptation and mitigation

In order to create a regional strategy for climate change adaptation and mitigation, in 2017 CATIE gave life to the Latin American and Caribbean Platform for Sustainable Livestock Intensification, which was financed by New Zealand, Fontagro and CATIE. In 2019, some of the most relevant outputs of this initiative include:

- Document on the state of the art of research and innovation for the sustainable intensification of livestock production systems and climate change adaptation/mitigation in Latin America and the Caribbean
- Analysis of the strengths and weaknesses of current livestock research programs in Latin America and the Caribbean (LAC).
- Coordinated regional agenda for research and development of sustainable intensive livestock systems in the context of climate change and a plan for its implementation.
- Regional database on sustainable livestock production technologies, practices and innovations, including methodologies and approaches to adapt and mitigate climate change in LAC, as well as people working on these issues.
- Local and regional events to share information with stakeholders on livestock systems and low greenhouse gas (GHG) emission technologies for climate change adaptation and mitigation.
- Document on training needs for capacity building in the sustainable intensification of animal production systems in Latin America and the Caribbean.
- Training materials for workshops.
- Online courses on topics relevant to the interests of platform members focused on sustainable intensification of livestock systems
- Inventory of existing and new policies for the promotion of sustainable livestock intensification in LAC
- Summary of policies for the promotion of intensive livestock systems with low greenhouse gas emissions in different countries of the Americas
- Drafting of five proposals and a concept note to give continuity to the actions carried out by this project.



Blue carbon: an ally in combating climate change

Coastal-marine ecosystems and communities are highly susceptible to climate change. They are already suffering from the negative effects of increased and more frequent storms, storm surges and hurricanes; coral mortality; decline in fisheries and other extractive resources associated with food security and livelihoods; loss of tourism potential; coastal erosion; and displacement of infrastructure. If sea level rise trends continue, nearly one billion people will be affected around the world by 2050.

The cost of global inaction far exceeds that associated with our urgent climate change adaptation needs. This urgency is greatest in our region, one of the most critically threatened by the negative impacts of climate change worldwide. Given this dynamic and since 2011, CATIE has been one of the global pioneers of “blue carbon”, developing scientific and political actions as innovative tools for climate action to strengthen the flows of ecosystem services and the livelihoods of rural marine-coastal populations in Latin America and the Caribbean. Toward this end, CATIE focuses on mangroves as the main ecosystems capable of providing a range of climate change adaptation and mitigation solutions for our developing societies.

After a decade of work on the issue, an emerging and basically unknown global issue has been positioned as a technical and political priority to increase the climate ambition of countries within the Paris Agreement. CATIE’s current leadership is undeniable: it is an important member of the International Partnership for Blue Carbon, one of the largest intergovernmental and multi-sectoral platforms developing the theme. CATIE has a permanent presence in the Scientific Working Group of the International Blue Carbon Initiative, the most important scientific and policy advisory platform in the world; and its senior specialist in the subject is the lead author of the IPCC’s Special Report on the Ocean and the Cryosphere. At the national level, methods for quantifying blue carbon stocks in mangroves have been developed and technical capacities strengthened in 75% of the countries in Central America and the Dominican Republic. In addition, the development of policy statements, instruments and actions has been facilitated in the service of the governments of Costa Rica and Colombia. The integrated institutional vision – natural resources, society and sustainable development – is making it possible to enhance the innovative synergies needed to meet the goals above and to strengthen the economic, social and ecological resilience of the marine-coastal territories of the American continent.



MESCYT and CATIE encourage dominican professionals to obtain quality graduate degrees

CATIE and the Ministry of Higher Education, Science and Technology (MESCYT) of the Dominican Republic are working together to strengthen the capacities of professionals in the Dominican Republic in the areas of sustainable agriculture and natural resource management, in order to contribute to the sustainable and economic development of the country.

MESCYT has awarded scholarships to send a total of 16 Dominican students to CATIE for the 2019-2020 and 2020-2021 academic periods.

In the last decade, 10 Dominicans have graduated from CATIE (six men and four women). Therefore, according to Isabel Gutiérrez, dean of the Center's Graduate School, this represents an important opportunity for the professional and personal growth of more young Dominicans.



Stories of Success

Climate-smart Energy

In 2019, CATIE installed 72 solar panels in one of its buildings in order to demonstrate the savings that can be achieved with the implementation of this type of technology. CATIE hopes to gradually replicate this initiative in other institutional facilities of higher-energy consumption. With this pilot project CATIE is moving towards the use of clean energy and climate-smart buildings, thus contributing to the environment by reducing the effects of global warming.

The size of the photovoltaic plant is 23.40 KwP and it generates 32,563 kWh per year (92% of the total energy consumed by the selected building). This represents an economic saving of USD 6,200 per year.

The total investment of the project is of approximately USD 29,000 and the return on investment will be achieved in about 4.8 years. The installation of the panels and the entire system was developed by the company Enertiva through a request for bid process, and in coordination with CATIE's Department of Information Technologies and Communication.



CIRAD and CATIE: a cooperation relationship of more than 30 years

For more than 30 years, CATIE and The French Agricultural Research Centre for International Development (CIRAD) have carried out relevant agricultural research for the region, thereby improving the quality of life of rural populations. Currently 10 CIRAD researchers work at CATIE headquarters in Costa Rica with a shared-cost partnership model. This model has achieved a win-win relationship where both institutions collaborate together in coffee-related projects, such as monitoring of the incidence of rust, agroforestry systems, cocoa, forests and remote sensing, among others.

At the end of 2019, the Directors General of both institutions signed an agreement to renew a second phase of the institutional research partnership for 10 more years (2017-2027) towards keeping the progress of initiatives such as the Scientific Cooperation Platform (PCP) and Agroforestry Systems with Perennial Crops. These initiatives contribute to maintain and increase the productivity, competitiveness, and sustainability of agroforestry systems with coffee and cocoa in Mesoamerica. The platform also involves the Regional Cooperative Program for the Technological Development and Modernization of Coffee Cultivation (PROMECAFE), the International Centre for Research in Agroforestry (ICRAF) and Bioversity International.

Michel Eddi, president and Director General of CIRAD, during his visit to CATIE for the signing of this agreement, commented that the long-term cooperation relationship kept and promoted by CATIE and CIRAD is the best way to face enormous national and global issues such as climate change and the degradation of biodiversity: "Both institutions have the capacity to build towards a common future, working on the topics and objectives we share to develop projects, mobilize responsibilities and find resources to work on what we must."





CATIE AT A GLANCE

Our numbers in 2019

Projects negotiated



47
projects
negotiated

that include:

- Technical assistance
- Training courses
- Research initiative



The approved
proposals total
USD
6 591 456



Distribution of plants and seeds

28 000 coffee plants in greenhouses for distribution.

4073 kg of forest seeds from 40 species to 52 clients in 14 countries.

115 951 hybrid plants and coffee varieties sold.

326 seed samples were collected from coffee accessions for distribution to 19 beneficiaries in five countries: Guatemala, Mexico, Nicaragua, Costa Rica and Honduras.



Productivity

To increase seed production of coffee varieties, a 2 ha Seed Garden was established which includes 10 of the most important varieties.



New businesses

A specialty ground coffee was marketed and “Productos Cabiria” was created to give added value to the fruit trees of the Botanical Garden.

Publications

137 publications

- 8 libros y monografías
- 3 Books, book chapters and monographs
- 18 Papers at conferences
- 31 Papers in scientific journals
- 7 papers en revistas técnicas
- 4 Presentations at congresses
- 2 Technical series
- 53 Theses
- 11 Reports and other publications



Finances

El CATIE mantiene un balance positivo en el año 2019, obteniendo un resultado neto de USD 15 937. La institución tiene su contabilidad basada en NIIF (Normas Internacionales de Información Financiera) y este año, se incorporó una nueva norma la NIIF 16 (arrendamientos), en la que se analizan los contratos de alquiler de instalaciones en sede y países.

Gracias al resultado favorable obtenido, el CATIE adsorbió una suma de USD 187 858 por aportes pendientes, de igual forma a través de la coordinación con los representantes o enlaces en los países miembros se logró una recuperación de cuotas países por USD 842 374.

Así mismo, el IICA aportó USD 1 000 000, lo que representó el 100% de la contribución al CATIE, siendo vital para lograr una salud financiera sana durante el 2019.

Finalmente, con la inyección de recursos provenientes de Fundatrópicos se han apoyado las actividades comerciales y con la implementación de paneles solares en el edificio Gilberto Páez se ha reducido la facturación eléctrica de forma significativa.

In 2019, CATIE maintained a positive balance with a net result of USD 15,937.00. Our institution bases its accounting on IFRS (International Financial Reporting Standards). A new standard (number 16) was added to IFRS this year, which is related to leases and the rental contracts for facilities in our headquarters and country offices.

Thanks to the favorable results obtained, CATIE received a sum of USD 187,858.00 related to pending contributions. In addition, and through coordination with country representatives or liaisons in member countries a recovery of country quotas of USD 842,374.00 was also achieved.

Moreover, during 2019 IICA contributed with USD 1,000,000.00, which represented 100% of its contribution to CATIE. This was vital for achieving healthy financial environment during 2019.

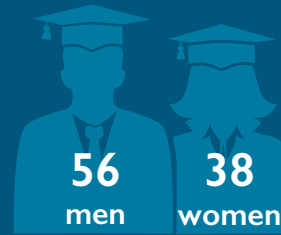
Finally, with the injection of resources from Fundatrópicos, commercial activities have also been supported. Other actions like the implementation of solar panels in the Gilberto Páez building have represented a significant reduction in electricity bills and consequently an increase in institutional savings.

Graduate school

New enrollments

94

new students in the 2019
Master's Program



18 countries

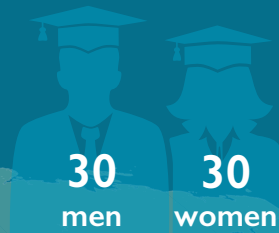
- Belize
- Bolivia
- Brazil
- Colombia
- Costa Rica
- Ecuador
- El Salvador
- United States
- Guatemala
- Haiti
- Honduras
- Mexico
- Nicaragua
- Panama
- Paraguay
- Peru
- Dominican Republic
- Taiwan

1 Mexican student
in the *Doctoral Program*

Graduates

60

graduates from the
Master's Program



20 countries

- Belize
- Brazil
- Chile
- Colombia
- Costa Rica
- Ecuador
- El Salvador
- Spain
- United States
- France
- Guatemala
- Haiti
- Honduras
- Mexico
- Nicaragua
- Panama
- Paraguay
- Peru
- Dominican Republic
- Uganda

1 Costa Rican graduate
from the *Doctoral Program*

Indicadores

8083 persons

(31% women and 69% men) from

**26 countries strengthened
their capacities**

The training offer included: courses, the cooperative international studies program (CSAP), diploma programs and professional internships.

- 
- Argentina
 - Bolivia
 - Brazil,
 - Canada
 - Chile
 - Colombia
 - Costa Rica
 - Cuba
 - Ecuador
 - El Salvador
 - United States
 - Guatemala
 - Holland
 - Honduras
 - Mexico
 - Nicaragua,
 - New Zealand
 - Panama
 - Paraguay
 - Peru
 - Puerto Rico
 - Dominican Republic
 - Uruguay
 - Venezuela





CATIE IN DETAIL
**Education that meets the
region's demands**

Postgraduate Training of the highest level

Our Graduate Program enjoys high prestige and international recognition for its academic quality.

With more than 70 years of training leaders in Latin America and the world, in 2019 the Graduate School launched three virtual master's degrees in the following areas:

Watershed Management
Agribusiness Management and Sustainable Markets
Agroecological Intensification and Food Security

Thanks to this, the School admitted about 94 students (including on-campus and online Master's degrees). More than 100 applicants who know about CATIE's experience and quality and who wish to be part of our prestigious institution were entered into the database of Admission: 80 in on-campus Masters Programs, 28 exchange students and 4 as part of the exclusive program for Graduates.

CATIE's educational offer is known through its Graduates who currently contribute to CATIE's leadership in Postgraduate Education working in academia, research centers and public and private entities. Additionally, in 2019 an online consultation and verification of the information of each Graduate from anywhere in the world was made available in an updated and transparent way.

The Graduate School, aware of the socioeconomic situation of most of the students applying for masters and doctoral degrees, offers financial aid initiatives and manages the necessary financial resources with third parties so that the financial aspect is not a limitation for the candidates. For this reason, strategic alliances were also key in 2019 in facilitating scholarship management processes for applicants and other initiatives, achieving the signing of seven agreements with institutions dedicated to the promotion and financing of higher education.

2019 was particularly special because of constant changes in the governments of the hemisphere and their socioeconomic crises, which directly affected efficiency in financial resource management. Therefore, countries such as Mexico, Colombia, El Salvador, Costa Rica, and Panama, which have historically contributed resources to the Scholarship Program, are limiting their decisions and reducing their available funding for education. These changes are guiding the Graduate School to propose a strategy for approaching potential funders other than the traditional ones, including private companies and the establishment of "basket" programs in which different sources contribute to a common fund that subsequently makes it possible to redistribute resources.

Agreements with institutions dedicated to the promotion and financing of higher education

Agreements were signed with the Ministry of Higher Education, Science and Technology (MESCYT) of the Dominican Republic; the University of Texas of the Rio Grande Valley; The 1890 University Foundation of the United States; Weihenstephan-Triesdorf University of Applied Sciences of Germany; Consortium Montpellier University of Excellence (MUSE) of France; and the University of Quisqueya of Haiti.

Other relevant actions in areas such as student wellbeing, the exchange program, accreditation and research activities are mentioned below:

Student wellbeing

With the aim of promoting adequate and harmonious conditions for the good academic performance of the student community and the wellbeing of their families, the Student Welfare Office improved the processes for visa applications and immigration procedures and provided accompaniment and counseling to students for emotional situations and/or conflict management. Monthly tours of student housing facilities were institutionalized for timely reporting of problems, damages, and situations for improvement. Similarly, several cultural exchange spaces were provided throughout the year and with the aim of supporting students in the care of minors, providing them with a space close to their academic activities, a children's playroom was opened in the Graduate School, which includes furniture, toys, games and other recreational elements.

Exchange Program

The Exchange Program has been particularly attractive to undergraduate and graduate students. In 2019, **50% of the students enrolled (14 students) were Europeans** from countries such as France, Spain and Italy. Some students who did their undergraduate internship at CATIE even returned to do their graduate internship or graduate studies at the School.

Research Symposium

For the third consecutive year, the Graduate School held its [research symposium](#); an academic space where students can socialize with the institution's scientific community. Thirty-seven different research projects in nine countries were presented on topics related to the environment, natural resources and agriculture. The symposium represented a space for academic exchange between students and professor-researchers of the Center and, as in the two previous editions, it included four thematic panels:

1. *Agroforestry and sustainable agriculture.* With 16 investigations to be carried out in five countries: Dominican Republic, Guatemala, Honduras, Mexico and Costa Rica.
2. *Economics, development and climate change.* With 10 investigations in Costa Rica, Dominican Republic, Colombia, Honduras and Guatemala.
3. *Management and integrated management of watersheds.* With 4 investigations to be carried out in Costa Rica and the Dominican Republic.
4. *Management and conservation of tropical forests and biodiversity.* With 7 investigations to be carried out in Costa Rica, Guatemala, Honduras, Nicaragua and the Dominican Republic.



Accreditation

The re-accreditation process for the Master's and Doctoral Programs with Costa Rica's National Higher Education Accreditation System (SINAES) promoted discussions and workshops throughout 2019 on the review and adjustment of graduation periods, curricula and evaluation criteria.

Success story: beyond the classrooms

Hellen Choco graduated in 2019 from the Master's Program in Economics, Development and Climate Change. Upon leaving CATIE, this young professional from Belize took on an important task for the development of her country: **to be in charge of facilitating the formulation of agroforestry public policy for Belize.** In this role, Choco will have an opportunity to interact with high-level representatives and obtain the necessary inputs to make this project a reality.

"I decided to study at CATIE because it is an institution well known for its development and research projects, especially in the agricultural world. I am sure that leading the development of this policy has been possible thanks to the courses and teachings I received during my studies at CATIE. I believe that this is a way to make a positive contribution to my country; I will be able to promote major changes that will contribute to the conservation of the environment and help with climate change adaptation and mitigation", **Hellen Choco, a graduate of CATIE from Belize.**



Raquel Vélez, a student from Colombia, shared her research which she presented at the Research Symposium of CATIE's Graduate School in San Antonio de los Caballeros, the Experimental Station of the Sugarcane Research Center of Colombia (CENICAÑA), as well as at a workshop organized by this institution where she also had the opportunity to participate as a speaker.

"At the end of the presentation, the director of the Tibaitatá Research Centre of AGROSAVIA invited me not only to visit the Centre's facilities, but also CIMPA's headquarters in Barbosa (which specializes in panel production). In my tour of these institutions I had two key interviews with experts in the area: Jader Rodriguez, the engineer in charge of energy

efficiency in sugar mills, and Gonzalo Rodriguez Borray, economist in charge of the social part of the projects", **Raquel Vélez, Colombian student, M.Sc. candidate in Economics, Development and Climate Chang.**



Renewing our training offer

Training has been a key tool for CATIE in building capacity; the institution has versatility and a capacity to react promptly on issues related to the situation and the specific demands of the countries. However, today the subject is of strategic importance, in both classroom and virtual modes. One significant fact that has become a trend is that technicians, government officials, and private sector and civil society agents are rarely able to take leaves of absence for long-term training purposes. This makes CATIE's training programs attractive for training qualified human resources in topics related to agriculture and the environment.

Therefore, in 2019, CATIE's Training Area entered an intense process of reactivation and a new coordinator with a long history of training activities was appointed. The reactivation of the unit included both the formulation and implementation of several regulations and guidelines to reorder training activities and achieve better articulation between the different CATIE units that carry out these activities (programs, projects and representations in the countries of the region).

All this restructuring work allowed for important achievements in a relatively short period of time, as detailed below:

Internship program in Peru. An internship program was established with the National Agricultural Innovation Program of the Institute for Agricultural Innovation (INIA/PINIA) of Peru to contribute to strengthening research capacities in CATIE's areas of expertise such as agroforestry, coffee, cocoa, sustainable livestock production, climate change, biostatistics, agribusiness, watersheds, participatory research, qualitative methods, sustainable rural development, innovative agricultural technologies, forests, and biodiversity, among others. Actions implemented included starting a three-week course at CATIE's headquarters in Turrialba, Costa Rica, with a group of 17 INIA officials who took an intensive program in topics ranging from biostatistics, data management and analysis, research, extension and innovation, climate change, inclusion and gender, value chains, as well as more specialized topics related to extension and innovation for participatory rural development, germplasm production and management, coffee and cocoa production, sustainable forest management and biodiversity management in protected areas and sustainable livestock. This program was taught using the learning by doing modality with talks by CATIE experts, field trips, practice exercises and guided readings.



An individual internship program was also developed and continues to operate, whereby INIA researchers carry out internships at CATIE for one to eight months at the time of year that is most convenient to them, working on topics of common interest with different CATIE projects. To date, 12 such internships have been completed. Work also continues with 115 files for 2020.

Training program with government institutions of the Dominican Republic. With the Ministry of Agriculture of the Dominican Republic, the development of a diploma course for 60 public and private sector professionals in integrated pest management (DiMIP) was planned, with a duration of 160 hours of attendance and composed of theoretical and practical sessions. This diploma course will be taught by CATIE and Dominican Republic teachers in this same country in 2020, with the objective of developing skills to address problems in the country's most important agricultural production systems. Two topics of interest to the country were worked on jointly with the Dominican Ministry of Natural Resources and Environment. The first is a five-day, face-to-face, practical course-workshop on integrated coastal zone management (ICZM) and marine spatial planning (MSP), which will be held in 2020 in three regions of the country: the Northern Region, the Southeastern Region, and the Metropolitan and Southwestern Regions, with the participation of technicians from the environmental department of the Ministry of Agriculture and the Ministry of Tourism, mayors, universities and NGOs. The second is a five-day course for capacity building of stakeholders involved in land use and land use change in the Dominican Republic (REDD+). The objective is to strengthen and increase technical capacities of key actors in the livestock sector, forests and protected areas linked to the implementation of the Emissions Reduction Program (ERP) of the country's forests, through techniques focused on the environmental sustainability of the activities they carry out, climate change mitigation, and the ERP. This course will also be held in 2020 and will cover topics such as sustainable low-carbon livestock production, sustainable forest management, natural landscape restoration, and protected area management in the context of climate change.

Training program with Nicaragua. Cooperation between CATIE and Nicaragua's Ministry of Environment and Natural Resources (MARENA) was established in early 2019 in the framework of the National REDD+ Strategy (ENDE-REDD+). One of the actions implemented was a 100% virtual diploma course in Geographic Information Systems (GIS) and remote sensing applied to natural resource management, which will also be implemented in May 2020. This cooperation will strengthen the capacities of the technical teams of the National Forestry Institute (INAFOR) and the Nicaraguan Territorial Studies Institute (INETER) to introduce, strengthen and develop skills in the management of GIS and remote sensing in the capture, storage, processing and dissemination of geo-referenced information for natural resource management and administration. In addition, an online course on forest governance, socio-environmental elements and monitoring systems for REDD+ was held in late 2019 to provide knowledge and capacity on forest governance and disseminate tools for the development of processes associated with social and environmental safeguards in the context of REDD+.

Training program with the municipality of Oxapampa in Peru. The cooperation was established in 2019 with the aim of contributing to the promotion and development of cooperative relations in the areas of forest management and conservation, biodiversity, agro-forestry, tropical agriculture and sustainable development. It began with a 10-day internship at CATIE's campus in Turrialba, Costa Rica, with the participation of the mayor, councilmen, technicians and civil society of Oxapampa Municipality. In this internship, the subject of economic retribution for water resources was worked on. In addition, a nine-day course was held in the city of Oxapampa, Peru, where work was done on hydrological modeling.

Success story:

“This internship represented a growth experience on both professional and personal levels. It was an opportunity to broaden and deepen my knowledge in value chain analysis and in the use of tools for capacity building in rural associative enterprises. Working with the indigenous women’s organization motivated me to continue focusing my skills in the search for better opportunities for inclusive, equitable and sustainable development”, **Claudia María Rojas**, a Peruvian who did an internship at CATIE, working with a women’s organization in a rural indigenous area of Costa Rica.





CATIE IN DETAIL

**Research for sustainable and
inclusive development**

Research in Economic Development and Environment

Contributing to the SDG



Addressing the challenges of climate change and variability

In 2019, the Research Program on Development, Economy and Environment (PIDEA) carried out several actions to address the challenges arising from climate change and variability. It generated applied research, provided advisory services and strengthened the capacities of key actors, including technicians from ministries of agriculture and environment, and development institutions in several countries of the region, such as Belize, Costa Rica, Jamaica and Paraguay, among others.

In order to address problems of water scarcity and low productivity in the use of water, which are exacerbated by climate change, several technical studies were carried out to support a programme of payments for environmental services in the Yallahs and Hope Basins, which provide water to the cities of Kingston and St. Andrew where 40 per cent of Jamaica's population lives. This program was innovative and has great potential for replication in other parts of the island and in the Caribbean in general because of its effectiveness in watershed protection; a task that draws on CATIE's more than 15 years of experience in designing, implementing and evaluating payments for environmental services in several countries of the region.



The LATINOADAPTA project sought to strengthen decision-making in the area of climate change adaptation, closing knowledge gaps identified in Costa Rica's National Report and strengthening the links between science and public policy. Among other actions, work was done to strengthen the already institutionalized platforms that act as networks for consultation, advising and channels of political influence in the country, and support was given to the Scientific Council on Climate Change (4C). The lessons learned from this experience will be used in the other five countries of the region that are part of the initiative (Argentina, Brazil, Chile, Costa Rica, Paraguay and Uruguay).

In 2019, support continued for business training that seeks to successfully, sustainably and inclusively scale up and insert MiSMEs (especially associative enterprises) into value chains. In this case, the work done in promoting productive and service enterprises aimed at the indigenous population in the framework of the capacity-building programme in indigenous territories in the Brunca Region of Costa Rica was noteworthy.

With the aim of strengthening the coffee sector in Central America, under the framework of the project on Socioeconomic and Environmental Sustainability of Agroforestry Coffee in Central America (SEACAF), economic, social and environmental trade-offs between agroforestry systems and coffee monocultures are being identified and evaluated. This study emphasized the economic and social contribution of coffee agroforestry to agricultural livelihoods. The results of this initiative will provide evidence to support the formulation of agricultural and environmental policies in the region.

Environment for Development (EfD): developing research in economics and development

After 12 years of operation at CATIE, EfD-Central America is consolidated as a regional reference in environmental economics and advising on the design of environmental policies in the region. In 2019, EfD carried out research in the following areas in collaboration with government actors:

1. Impact of public policies to minimize the effect of flooding in urban and rural areas
2. Mechanisms for adapting to the negative effects of climate change on human capital formation
3. Carbon tax design and implementation options

In addition, in conjunction with seven countries around the world and with funding from the Swedish International Development Cooperation Agency (SIDA), EfD contributed to the design and application of a methodology to economically value environmental services (e.g. pollination and water purification) and to include them in national accounts systems (Gross Domestic Product) through the use of economic valuation methodologies that can be replicated in low-, middle- and high-income countries.

Under the Sustainable Management of Oceans and Marine Resources project, which is being developed in Chile, South Africa, Tanzania, Vietnam, India and Costa Rica, innovative tools from the experimental economy are applied to encourage changes in the behavior of the different actors in the production and consumption chain of plastics that pollute marine and coastal areas. In particular, research was conducted on the impact of the use of biodegradable packaging on agricultural product markets and the characterization of different public policy options to minimize the use of polluting plastics.

Capacity Building

Training of Trainers in Climate-Smart Agriculture (CSA) in Belize

In 2019, 44 extension agents from MAFFESDI (Ministry of Agriculture, Forestry, Fisheries, Environment, Sustainable Development and Immigration) were trained in CSA. These technicians now have knowledge and tools that allow them to assess the risk of climate-related impacts arising from the interaction of climate hazards with the vulnerability and exposure of agricultural systems, and they have a set of proven practices that can be used to mitigate these risks.

Network for strengthening the economic valuation of ecosystem services in the Gran Chaco Region, Paraguay-Argentina

CATIE contributed to the creation and strengthening of this network, including participation in the First International Seminar on Valuation of Ecosystem Services in Argentina, in collaboration with the National University of Formosa and the National University of Asunción.

Capacity building in indigenous territories in the Brunca region, Costa Rica

In order to promote productive enterprises and successfully, sustainably and inclusively insert them in value chains, in 2018 and 2019, CATIE worked on business training for 373 indigenous Bribri and Ngäbe families (about 150 women and 223 men) from the Brunca region of Costa Rica, who are undertaking agricultural or service activities. Among the most relevant results is the generation of at least 20 commercial alliances, the most relevant being the one reached with fashion designer Víctor Alemán (Timberland's representative in Costa Rica) and the INOV8 company for production, highlighting the launch of high fashion garments based on cultural elements of the indigenous groups. Some of these garments will even be put on sale at the international airport of Costa Rica. This program was created at the request of the Instituto Mixto de Ayuda Social (IMAS).

A partnership that is bearing fruit

CATIE made recommendations to IMAS (Brunca headquarters) on the way its social aid programs for indigenous populations are structured; these were accepted and changes were made in both the approach and the duration of the training, with follow-up given to the beneficiaries. Thanks to the training program and this contribution, the institution has expressed its interest in continuing to support CATIE's work in the Brunca region with the possibility of applying it in other regions of the country. In addition, two tools were developed: one measures the capacity that each person has to become an entrepreneur and the second allows an analysis of the level of business development in an established enterprise. Both tools have been adjusted for working with indigenous populations (differentiating element) and their use allowed the development of a training network in accordance with the capacities of the beneficiaries and the potentialities detected in the Brunca region.



Innovative courses that meet the demands of the region

Lessons for the implementation of Payment for Environmental Services (PES). At the request of several governmental actors in the Government of Jamaica, a course was held to build capacity in the design and implementation of PES. Ten professionals (six women) participated, who came to CATIE's headquarters to learn first-hand about the institution's and Costa Rica's experience in implementing PES in order to start a similar program in Jamaica.

Economic foundations for the management and valuation of environmental services. This was given to 14 people (nine women) from seven countries from the governmental sector, non-governmental organizations (NGOs), international organizations, etc., and it was offered for the twentieth consecutive time at CATIE's headquarters, providing tools for economic valuation of the environment, as well as public policy options based on economic incentives for ecosystem management in the region.

Capacity building in carbon measurement and economic valuation of environmental services. At the request of the Jamaican Forestry Department, several courses were provided to 54 professionals (36 women) regarding carbon measurement and monitoring for REDD+ programs, as well as the use of economic valuation methodologies for environmental services provided by forests and forest plantations in Jamaica.

Training of trainers and governance in associative companies (virtual mode). This was aimed at fifteen people (eight women) from eight countries, who are in technical positions linked to work with rural associative enterprises or who are part of associative enterprises. Work was done on practical methodologies for capacity building (coaching), organizational management and good governance, capacity-building in carbon measurement and economic valuation of environmental services. At the request of the Jamaican Forestry Department, several courses were provided to 54 professionals (36 women) regarding carbon measurement and monitoring for REDD+ programs, as well as the use of economic valuation methodologies for environmental services provided by forests and forest plantations in Jamaica.

Development of a seal for sustainable soy production

The Union of Cooperatives (UNICOOP), the Agricultural Production Cooperative (COPRONAR) and the Ministry of Environment and Sustainable Development (MADES) of Paraguay sought CATIE's support for the formulation of a seal based on sustainable agribusiness through the implementation of best agricultural practices that integrate economic, social and environmental criteria; as well as developing a parallel process for capacity building in the soybean value chain in Paraguay that involves companies linked to soybean production that want to differentiate their product. To achieve this, a (digital) tool was developed to evaluate production systems and determine their sustainability. The tool has a series of criteria, indicators and elements that are directly linked to social, environmental and economic aspects.

Our strategic partners

By strengthening its strategic alliances, CATIE has been able to enhance its actions with the support of multiple local, national and international partners.

Public sector

- Ministry of Agriculture, Forestry, Fisheries, Environment, Sustainable Development and Immigration (MAFFESDI) of Belize
- Joint Institute for Social Assistance (IMAS)
- Union of Cooperatives (UNICOOP)
- Agricultural Production Cooperative (COPRONAR)
- Ministry of Environment and Sustainable Development (MADES)

International organizations

- The National Environment and Planning Agency (NEPA)
- Forestry Department (FD)



Most relevant publications of 2019

Below are the 10 most relevant publications for 2019, including one publication in the journal *Nature Climate Change* and two in the *Proceedings of the National Academy of Sciences of the United States of America* (PNAS).

- Alpizar, F; Bernedo del Carpio, M; Ferraro, PJ; Meiselman, B. 2019. The impacts of a capacity- building workshop in a randomized adaptation project (en línea). *Nature Climate Change* 9: 587-591. Consultado 04 mar. 2020. Disponible en <https://www.nature.com/articles/s41558-019-0536-3>
- Van Etten, J; De Sousa, K; Aguilar, A; Barrios, M; Coto, A; Dell'Acqua, M; Fadda, C; Gebrehawaryat, Y; Van de Gevel, J; Gupta, A; Kiros, A; Madriz, B; Mathur, P; Mengistu, D; Mercado, L; Nurhisen-Mohammed, J; Paliwal, A; Enrico-Pè, M; Quirós, C; Rosas, JC; Sharma, N; Singh, S; Solanki, I; Steinke, J. 2019. Crop variety management for climate adaptation supported by citizen science (en línea). *PNAS* 116(10):4194-4199. Consultado 04 mar. 2020. Disponible en <https://doi.org/10.1073/pnas.1813720116>
- Sterner, T; Barbier, E; Bateman, I; Van den Bijgaart; Crépin, AS; Edenhofer, O; Fishcer, C; Habla, W; Hassler, J; Johansson-Stenman, O; Lange, A; Polasky, S; Rockström, J; Smith, HG; Steffen, W; Wagner, G; Wilen, JE; Alpizar, F; Azar, C; Carless, D; Chávez, C; Coria, J; Engström, G; Jagers, S; Köhlin, G; Löfgren, Å; Pleijel, H; Robinson, A. 2019. Policy design for the Anthropocene (en línea). *Nature Sustainability* 2:14-21. Consultado 04 mar. 2020. Disponible en <https://www.nature.com/articles/s41893-018-0194-x>
- Herrera, D; Pfaff, A; Robalino, J. 2019. Impacts of protected areas vary with the level of government: Comparing avoided deforestation across agencies in the Brazilian Amazon (en línea). *PNAS* 116(30):14916-14925. Consultado 04 mar. 2020. Disponible en <https://doi.org/10.1073/pnas.1802877116>
- Beveridge, L; Whitfeld, S; Fraval, S; Van Wijk, M; Van Etten, J; Mercado, L; Hammond, J; Davila-Cortez, L; Suchini, JG; Challinor, A. 2019. Experiences and Drivers of Food Insecurity in Guatemala's Dry Corridor: Insights from the Integration of Ethnographic and Household Survey Data (en línea). *Frontiers in Sustainable Food Systems*. Consultado 04 mar. 2020. Disponible en <https://doi.org/10.3389/fsufs.2019.00065>
- Viguera, B; Alpizar, F; Harvey, C; Martínez-Rodríguez, R; Saborío-Rodríguez, M; Contreras, L. 2019. Climate change perceptions and adaptive responses of small-scale farmers in two Guatemalan landscapes (en línea). *Mesoamerican Agronomy* 30(2):313-331. Consultado 04 mar. 2020. Disponible en DOI 10.15517/AM.V30I2.33938
- Viguera, B; Alpizar, F; Harvey, C; Martínez-Rodríguez, R; Saborío-Rodríguez, M. 2019. Climate change perceptions and adaptive responses of small-scale coffee farmers in Costa Rica (en línea). *Mesoamerican Agronomy* 30(2). Consultado 04 mar. 2020. Disponible en DOI 10.15517/AM.V30I2.32905
- Thornton, PK; Loboguerrero, AM; Campbell, BM; Kavikumar, KS; Mercado, L; Shackleton, S. 2019. Rural livelihoods, food security and rural transformation under climate change (en línea). Consultado 04 mar. 2020. Disponible en <https://ccafs.cgiar.org/es/publications/rural-livelihoods-food-security-and-rural-transformation-under-climate-change#.XmKIMi3SFfQ>
- Madrigal, R; Capitán, T; Salas, A; Córdoba, D. 2019. Household and community responses to seasonal droughts in rural areas of Costa Rica. *Waterlines* 38(4):297-315.
- Chávez, I; Partelow, S; Madrigal-Ballester, R; Schlüter, A; Gutierrez, I. 2019. Do responsible shing areas work? Comparing collective action challenges in three small-scale sheries in Costa Rica (en línea). *International Journal of the Commons*. Consultado 04 mar. 2020. Disponible en <https://www.thecommonsjournal.org/articles/10.18352/ijc.923/>

Stories of Success

Training of Trainers in Climate Intelligent Agriculture (CSA)

Ministry of Agriculture, Forestry, Fisheries, Environment, Sustainable Development and Immigration (MAFFESDI) of Belize

Objective: To support extension workers and farmers in Belize in improving their capacity to reduce the risks associated with climate change

“Thanks to the training and manual developed by CATIE, MAFFESDI technicians are trained and have tools that facilitate the use of the CSA approach as a strategy to address climate risk. In addition, they will be able to diagnose the risk of climate hazards and identify and promote the adoption of practices for small producers to reduce the impact of climate change on their livelihoods. This will help us strengthen Belize’s agricultural sector, deal with climate threats, and be competitive in international markets,” **Victoriano Pascual, Director of Climate Change, MAFFESDI.**



Capacity-building program in indigenous territories of the Brunca Region in Costa Rica, Instituto Mixto de Ayuda Social (IMAS)

Objective: to promote productive enterprises and insert them successfully, sustainably and inclusively in value chains

“I’m living a dream I don’t want to wake up from. It has been an incredible experience what we have lived during the whole training process provided by CATIE. I never thought I would see models wearing my clothes, much less that I would be able to go with them, but now I want to continue working, creating clothes that are different from what I had traditionally done; this will give me more opportunities to sell and have more money for the house and the business”, **Julia Montezuma, participant in the program for the Altos de San Antonio Community, Ciudad Neyli, Costa Rica.**

Agriculture, Livestock Production and Agroforestry

Contributing to the SDG



International cocoa and coffee collections of global importance

In 2019, CATIE celebrated the anniversary of the cocoa (75 years) and coffee (70 years) collections, which are recognized worldwide for the wide genetic diversity they preserve, as they are essential in ensuring the future of both crops. The anniversary event took place at CATIE's headquarters and brought together important players in the cocoa and coffee sectors. It also featured presentations by experts who shared the history and importance of the collections for research and the dissemination of genetic resources, as well as the success story of the Geisha variety of coffee in Panama.

In addition, as part of the Global Strategy for the Conservation of Coffee Genetic Resources, a study by the Crop Trust was conducted to assess the current status of the collection and propose actions to ensure its conservation and long-term availability.

In this regard, new initiatives and financial support were negotiated in 2019 to preserve both collections. In the case of the International Coffee Collection, support was provided by several institutions such as the Costa Rican Coffee Institute (ICAFE), *San Francisco Bay Coffee*, and the Central American Program for Integrated Coffee Rust Management (PROCAGICA). For its part, the project *Maximizing Coffee and Cocoa Opportunities in the Americas* (MOCCA) supported the general maintenance of the plantations of the International Cocoa Collection for the next three years.

Seed garden of selected coffee varieties

There is a growing interest among coffee companies for certain varieties that are present in CATIE's International Coffee Collection. These varieties have stood out in international competitions due to characteristics that make them attractive for new exclusive coffee markets: ET-47, Geisha, Java, Laurina, Mibirizi, Mokka, Rume Sudan, SL-28, SL-34 and Wush wush. In 2019, a 2-hectare seed garden was created on CATIE's land using materials from all of these varieties with the aim of increasing seed production in the short term in order to meet the growing demand for these promising materials.



CATIE is also part of the *Cacaonet Task Force* initiative, which supports the management of cocoa collections worldwide. Thanks to this initiative the *World Cocoa Foundation* (WCF) will provide support to CATIE and Trinidad's collections.

More and better varieties of coffee and cocoa available in the region

In 2019, CATIE made available to the region about 115,951 coffee plants, including F1 hybrids with exceptional characteristics of productivity, resistance to pests and diseases, as well as other promising varieties. Of the total number of plants distributed 84,382 were produced by an innovative method of rooting cuttings at CATIE's Forest Seed Bank (BSF) and 31,569 by the *in vitro* process called somatic embryogenesis, developed at the Center's Biotechnology Laboratory. This represents the highest number of plants produced in a year to date at the laboratory.

In search of better cocoa clone alternatives for distribution, the Biotechnology Laboratory carried out several investigations for the development of embryos. As a result, two embryos in particular (Jiffy pellets and Ellepots) showed special characteristics (small, light and biodegradable) that offer great possibilities for the production of cocoa clones in a faster, more efficient and environmentally friendly way.

In addition, an agreement was signed with the Mexican biotechnology company *Global Nature Technology* to supply coffee and cocoa germplasm for its multiplication and distribution in Mexico and other countries in the region. The company will set up its laboratories on CATIE's land, which represents the beginning of a new phase in attracting high-tech companies to the campus.

Genetic improvement
CATIE researchers and their partners continue their studies and evaluations for genetic improvement. More than 50 F1 coffee hybrids are being evaluated and a new set of nine improved cocoa clones will soon be released.



Research and Development in Agroforestry

CATIE's agroforestry coffee trials turned 19 years old in 2019. This trials continue to generate research results with recommendations for producers in the region. The results of all these investigations currently serve and will serve to guide the regional coffee sector towards better agroforestry production strategies, as well as increasing yields and the provision of ecosystem services.

In the cocoa research field, efforts were focused on generating proposals for innovations and their further application in development projects. The team worked on topics related to the use of technologies such as drones and shadow-simulation software to make agroforestry diagnoses of cacao crops. The results support decision-making processes to improve the design and management of cocoa plantations as well as combining the Schools of Field (ECA) with virtual teaching (digital animation, monitoring of activities and goals with cell phones). These technologies are already being developed in a cocoa project in Honduras (led by Heifer) and in the short term they will be used in other agroforestry projects.

The participatory research project for the renewal of cocoa plantations in eight Latin American countries (financed by the Korean Cooperation for Food and Agriculture in Latin America - KoLFACI) continued in 2019. This project laid the foundations for the establishment of a 4-hectare area for applied agronomic and agroforestry research with cocoa on CATIE's La Montaña farm, in which medium- to long-term trials will be carried out to generate specific technological packages (fertilization, integrated pest management, diversification) to offer to the region's cocoa farmers.

Actions against climate change
Supported by the Climate Technology Center and Network (CTCN), the Government of Belize is leading the development of the National Agroforestry Policy, as part of the country's actions to address climate change mitigation and adaptation.

Together with PROCAGICA, 200 plots of land were established in four Central American countries for participatory experimentation and validation of innovative practices for integrated management of coffee as well as pest and disease control.

In addition, a documentation process of the role of mixed plantations in commercial restoration-reforestation as an alternative for the production of wood-based products was carried out under the framework of the Forests, Trees and Agroforestry (FTA) program of the Center for International Forestry Research (CIFOR).

The *Trees on Farms* project represents another successful effort in Agroforestry. It has helped the Honduran government on reporting on biodiversity conservation indicators and improving livelihoods through the use of trees in the country's agricultural landscapes. The project is funded by the International Climate Initiative (IKI) of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), led by the World Agroforestry Centre (ICRAF) in which the consortium of institutions includes CATIE in Honduras, CIRAD-CIFOR in Indonesia, Gottingen University, Hanover University and the International Union for Conservation of Nature (IUCN).



Towards sustainable, low-carbon livestock production in the region

CATIE has supported the livestock sector and the governments of Honduras, Costa Rica, Guatemala, Nicaragua, Cuba and Panama in the design of public policies through technical inputs and participation in governance spaces with the aim of achieving sustainable livestock production. In the case of Costa Rica support was provided for the implementation of the Nationally Appropriate Mitigation Actions (NAMA). In Panama, Guatemala and Cuba contributions were directed towards the design of a national sustainable livestock strategy. The greatest achievement was obtained in Honduras, where, with support from the NAMA Facility and in coordination with the Ministry of Agriculture and Livestock and the Ministry of Environment, the banking and private (industry) sectors, academia and other trade unions, will design a national program to transform the livestock sector towards a low-carbon economy.

Moreover, the management of mechanisms to access public finances through a green credit in Honduras was made possible during 2019 through a proposal for a differentiated financial mechanism directed towards the livestock sector. At the same time, other actions were carried out in this country for the generation of an emissions baseline for the development of the livestock NAMA, through the development and monitoring of biodiversity and carbon methodologies, as well as sustainability indicators based on the principles and standards of the Sustainable Agriculture Network (SAN) for livestock. In addition, a strategy was designed with the private sector and associated unions to improve meat and milk value chains. The strategy will make possible to identify niche markets for sustainable livestock products.

All these actions were carried out through the *Productive Landscapes* project, which is funded by the Global Environment Facility (GEF) through the United Nations Development Program (UNDP) and in coordination with the Honduran Ministry of the Environment.



In 2019, CATIE worked jointly with the *Livestock Belize* project, which is financed by the Multilateral Investment Fund and under the administration of the Inter-American Development Bank (IDB-MIF). Under the framework of this project, CATIE was responsible for the characterization of 10 model farms located in the Cayo and Orange Walk districts of Belize as well as the identification of silvopastoral options for the improvement of climate change resilience in these farms. These actions serve as a basis for learning processes for technicians from the *Belize Livestock Producers Association (BLPA)* and the Belize Ministry of Agriculture, as well as BLPA producer partners.

In Mexico, CATIE worked in the territories of Jalisco, Campeche and Chiapas through the project *Biodiversity and Sustainable Agroforestry Livestock Landscapes*, known as BioPaSOS. By coordinating with the Ministries of Agriculture and Environment, this project promotes sustainable livestock among more than 1200 producers who were trained to establish silvopastoral systems and implement best livestock practices using the Field Schools (ECA) methodology. ECA was adapted to each of the three territories: in Jalisco, for example, it will be implemented in the territories of the Intermunicipal Environmental Board for the Integrated Management of the Lower Ayuquila River Basin (JIRA) and the Intermunicipal Environmental Board of the South Coast (JICOSUR), in coordination with the Secretariat of Agriculture and Rural Development (SADER). SADER recently decided to adopt ECA methodology in the training of livestock producers in the remaining three intermunicipal boards of the state, which is a great achievement of CATIE in terms of policy advocacy and project impact.

In the framework of the *Sustainable Futures* project for the Costa Rican dairy sector: Optimization of Environmental and Economic Results (SUSCORIDA) a study was conducted to determine future sustainable scenarios for food production in the tropics, using the Costa Rican dairy sector as a pilot scenario. The study focused on pasture quality, methane and nitrous oxide emissions in tropical systems, and the measurement of ammonia emissions and nitrate and phosphate infiltration. The results of the project showed that cow feces deposited on the pasture when animals leave the paddocks, generate ammonia emissions of about 10 g/ha/h, which decreases as the hours go by to emissions of 2 g/ha/h at the time of fertilization.

The study was implemented by CATIE in conjunction with *Bangor University* with support from the *Global Challenge Research Fund Foundation Award (GCRF)*, *Rothamsted Research* and funded by the *Biological and Biotechnology Research Council (BBSRC)* of the United Kingdom.



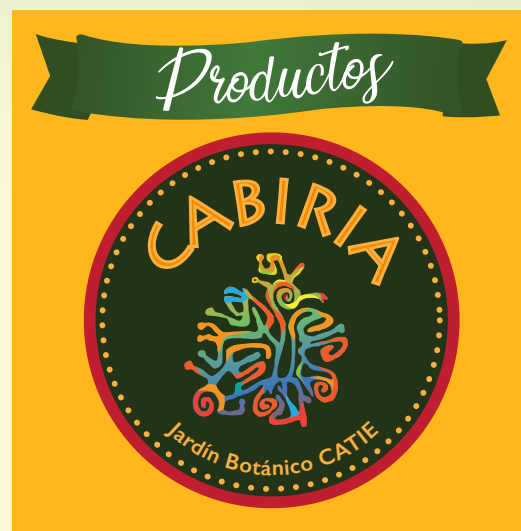
Innovative products that make a difference

Towards the exploration of new businesses, the distribution of a CATIE-specialty coffee was initiated, using the main coffee hybrids as a base. We also worked on the initiative to give added value to the fruits of CATIE's Botanical Garden through the registration of the CABIRIA brand.

CATIE-Specialty Coffee is a venture that began in 2019 to market specialty coffees from materials produced by the Coffee Breeding Program and some outstanding varieties from CATIE's International Coffee Collection. In the introduction stage, work was carried out with two of the FI coffee hybrids (Centroamericano and Esperanza) and in 2020 the offer will be increased with four varieties: SL 28, Geisha, ET-47 and Milenio. The process of registering the brand and sanitary permit for the products is already underway.

Productos CABIRIA began in 2019 as a promising initiative of the Collections and Botanical Garden for the development of innovative food products based on tropical fruits, preserved in CATIE's collections since 1944. The potential in this field is extensive, and the objective is to develop an agribusiness with the potential to scale-up for agroindustry and export, through linkages between the Botanical Garden and strategic partners, so that CABIRIA products make a difference.

The products have shown excellent acceptance and they represent an opportunity for business after more than a year of research. Work is also underway to develop substitutes for animal-based meat, using a coffee by-product. Productos Cabiria has the permission of the Ministry of Health and the municipal patent and the registration of the brand was submitted with approval expected in 2020.



Our strategic partners

By strengthening its strategic alliances, CATIE has been able to enhance its actions with the support of multiple local, national and international partners. The following highlights those with which various initiatives were developed in 2019, with the aim of achieving sustainable and inclusive development:

Universities

- University of Vermont, United States
- University of Guadalajara, Mexico
- Autonomous University of Chiapas, Mexico
- Juárez Autonomous University of Tabasco, Mexico
- Technological Institute of China, Mexico

National or local governments

- Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA), Mexico
- National Institute for Forestry, Agriculture and Fisheries Research (INIFAP), Mexico
- Intermunicipal Boards of Jalisco
- National Commission for the Knowledge and Use of Biodiversity (CONABIO), Mexico
- CGIAR Consortium-Research Program on Forests, Trees and Agroforestry (FTA):
- CIFOR, ICRAF, CIRAD, Bioversity, TROPENBOS
- Coffee Institute of Costa Rica (ICAFFE)

Research centers and foundations

- *Global Crop Diversity Trust*
- Inter-American Institute for Cooperation on Agriculture (IICA)
- Produce Foundation Jalisco, Mexico
- Center for International Cooperation in Agronomic Research for Development (CIRAD)

Private enterprises

- Agrinet, Mexico
- Western Ecoforest Agriculture and Reforestation, Guatemala
- *Global Nature Technology*, Costa Rica and Mexico
- *Rijk Zwaan*, Holland
- SEMIRSA Forestal SAC, Peru
- GAIA Artisan Coffee, Costa Rica



Most relevant publications

The 10 most relevant publications of 2019 on agriculture, agroforestry and livestock are presented below:

- Sepúlveda, N; Vågen, TG; Winowiecki, LA; Chiputwa, B; Makui, P; Somarriba, E; Sampson, AL. 2019. Sentinel Landscape stocktaking pilot study: Report Nicaragua-Honduras. Working Paper 2. Bogor, Indonesia, The CGIAR Research Program on Forests, Trees and Agroforestry (FTA). Consultado 04 mar. 2020. Disponible en DOI: 10.17528/cifor/00
- Gutiérrez-Ortiz, A; Bertia, F; Solano-Sánchez, W; Navarini, L; Colomban, S; Crisafulli, P; Forzato C. 2019. Distribution of p-coumaroylquinic acids in commercial Coffea spp. of different geographical origin and in other wild coffee species. Food Chemistry 286:459-466.
- Fister, A; Leandro-Muñoz, ME; Zhang, D; Marden, J; Tiffin, P; De Pamphilis, C; Maximova, S; Gultinan, M. 2020. Widely distributed variation in tolerance to Phytophthora palmivora in four genetic groups of cacao (en línea). Tree Genetics & Genomes 16(1). Consultado 04 mar. 2020. Disponible en DOI: 10.1007/s11295-019-1396-8
- Avelino, J; Vilchez, S; Segura-Escobar, MB; Brenes-Loaiza, MA; De Melo-Virginio, E; Casanoves, F. 2020. Shade tree Chloroleucon eurycyclum promotes coffee leaf rust by reducing uredospore wash-off by rain (en línea). Crop Protection 129. Consultado 04 mar. 2020. Disponible en <https://doi.org/10.1016/j.cropro.2019.105038>.
- Cerda, R; Orozco, L; Sepúlveda, N; Carreño, G; Ordóñez, J; Amores, F; Caicedo, W; Oblitas, S; Somarriba, E. 2019. Tropical agroforestry and ecosystem services: trade-off analysis for better design strategies (en línea). Mosquera-Losada M; Prahu R. (eds). En Agroforestry for sustainable agriculture. Burleigh Dodds Series in Agricultural Science. 43p. Consultado 04 mar. 2020. Disponible en <http://hdl.handle.net/11554/9089>
- Merle, I; Pico, J; Granados, E; Boudrot, A; Tixier, P; De Melo-Virginio, E; Cilas, C; Avelino, J. 2019. Unraveling the Complexity of Coffee Leaf Rust Behavior and Development in Different Coffea arabica Agroecosystems (en línea). Phytopathology 110(2). Consultado 04 mar. 2020. Disponible en DOI: 10.1094/PHYTO-03-19-0094-R
- Ardila-Fernández, F; Sepúlveda, C; Ibrahim, M; Detlefsen, G. 2019. Especies arbóreas en la alimentación del ganado y su relación con la diversidad orística en relictos de bosques en paisajes ganaderos de Campeche. M.Sc. Thesis.
- Chain-Guadarrama, A; Martínez-Salinas, A; Aristizábal, N; Ricketts, TH. 2019. Interacting ecosystem services: a review of pest control, pollination, and potential effects of climate change in coffee systems. Agriculture, Ecosystems and Environment. Papers in refereed scientific journals
- Estrada-Carmona, E; Martínez-Salinas, A; DeClerck, FAJ; Vilchez-Mendoza, S; Garbach, K. 2019. Managing the farmscape for connectivity increases conservation value for tropical bird species with different forest-dependencies. Journal of Environmental Management. Papers in refereed scientific journals.
- Suber, M; Gutiérrez-Beltrán, N; Torres, CF; Turriago, JD; Arango, J; Banegas, NR; Berndt, A; Bidó, DIM; Burghi, V; Cárdenas, DA; Cañanda, P; Canu, FA; Chacón, AR; Chacón Navarro, M; Chará, J; Diaz, L; Huamán-Fuertes, E; Espinoza-Bran, JE; Girón-Muñoz, PR; Guerrero, Y; Gutierrez-Solis, JF; Pezo, D; Prieto-Palacios, G; Roman-Cuesta, RM; Rosales-Riveiro, KA; Rueda-Arana, C; Sepúlveda, C; Serrano-Basto, G; Solarte, A; Woo-Poquioma, N. 2019. Mitigación con Sistemas Silvopastoriles en Latinoamérica: Aportes para la incorporación en los sistemas de Medición Reporte y Verificación bajo la CMNUCC. Working Paper No. 254, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).
- Tobar, D; Bonin, M; Andrade, H; Pulido, A; Ibrahim, M. 2019. Deforestation processes in the livestock territory of La Vía Láctea, Matagalpa, Nicaragua (en línea). Journal of Land Use Science 14(3):225-241. Consultado 04 mar. 2020. Disponible en <https://doi.org/10.1080/1747423X.2019.1671907>

Stories of Success



BioPaSOS Project

Through the collaboration between the Autonomous University of Chiapas (UNACH) and the BioPaSOS project, low-cost biodigesters were designed using locally available inputs as a strategy to reduce methane emissions on cattle ranches.

One such biodigester was implemented on a producer's ranch. Luis Fernando Molina, professor at UNACH, said that the implementation of this biodigester allow us to know exactly how this best practice contributes to greenhouse gases (GHG) mitigation on cattle ranches. In addition, it will provide information on how much firewood is no longer needed in the producer's home once the gas produced and stored in the biodigester is being used.

Laura Madera, a livestock producer from Jalisco, Mexico, participated in one of the BioPaSOS Project's Field Schools to learn how to implement best livestock practices on her ranch.

"Through the Field Schools, the project has taught us about best livestock practices. It has given us tools to realize how much money we have been throwing away and how much we have contaminated. Now, on our cattle ranch we are putting into practice what they teach us and we are seeing better results in production and saving money".



Forests, Biodiversity and Climate Change

Contributing to the SDG

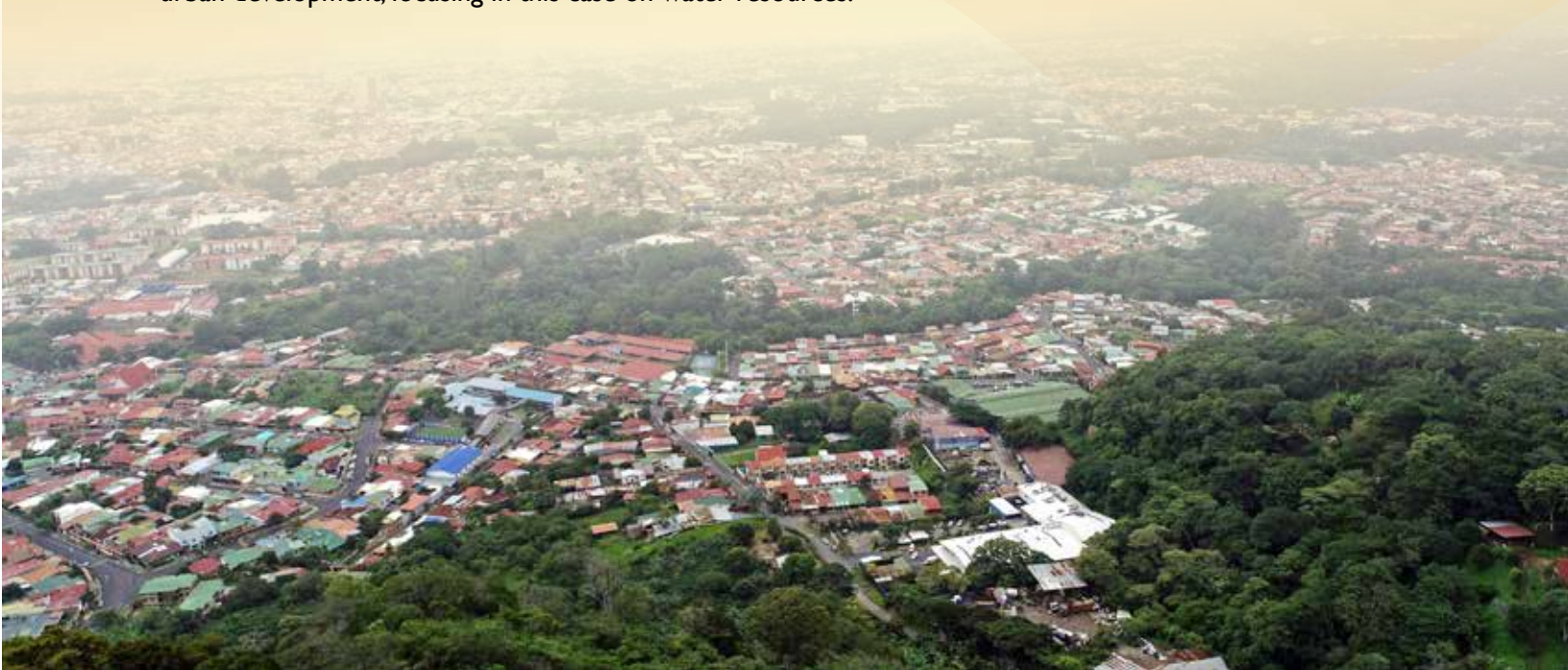


Towards sustainable urban areas

In 2019, the Ecosystem Modeling Unit (EMU) of the Forests, Biodiversity and Climate Change Program (PBBCC), through various urban ecology initiatives in Costa Rica made a key contribution to the environmental initiatives of the Municipality of Curridabat; which by year-end had been extended to 31 municipalities in the Greater Metropolitan Area of Costa Rica.

The UME characterized the green and blue infrastructure of these urban areas, determining the behavior of surface temperatures and measuring ecological connectivity as inputs for the municipalities' territorial planning. All this work led to the creation of the first report on the status of biodiversity in an urban municipality. This report allows an evaluation of the progress towards the vision of the municipality: the Ciudad Dulce (Sweet City), which aims to improve the well-being of citizens through increased contact with nature and by integrating city growth with a sustainable development approach.

The Watersheds and Water Security Unit (UCSH) entered the field of urban watersheds through the implementation of the project *Measuring sustainability in cities: valuing trees and their services*, with support from the municipality of Turrialba, the Rural Development Institute (INDER) and other actors in Costa Rica. In addition, UCSH team worked with the Municipal Development Institute of Costa Rica to support the management of the Intermunicipal Agency of the Maria Aguilar River Sub-basin-AIRMA. Again, this project supported the vision of the municipalities to move towards a model of multilevel governance for sustainable urban development, focusing in this case on water resources.



Activa Business Lab: a new platform for forestry businesses

With funding from the International Climate Initiative's (IKI) *Secondary Forests* project, CATIE led the creation of the Activa Business Lab (<http://activa.catie.ac.cr/>). The Lab aims to facilitate the process of rural and indigenous communities and agricultural and forestry producers in developing innovations and closing the gap between potential investors and the territories they inhabit. The ventures supported to date include *Sacalá* of Jilotepeque, Guatemala, and *Hartmade*, of Turrialba, Costa Rica.

This sector has traditionally been excluded from new entrepreneurial, acceleration and financing movements. For this reason, they addressed the challenges faced by rural entrepreneurs in the agricultural and forestry sectors, promoting the creation of new disruptive, innovative and inclusive business models based on intellectual property, all with positive social and environmental impacts.

These business models will promote rural economic development, connect rurality with new economic dynamics, support and encourage rural entrepreneurship, accelerate small and medium enterprises (SMEs) with high potential to generate positive social and environmental impacts, introduce innovation in rural areas, as well as nurturing rural businesses with financing and training to grow with green economy elements.

Finally, a *hackathon*-type technological challenge was carried out in Guatemala; which sought to generate an affordable and sustainable housing solution where the predominant material was wood. For this process, 32 proposals were received from which three were selected, and the team members had a pre-incubation process to generate their business model.



Climate change mitigation and adaptation through management of forests and forested landscapes

The project *Mechanisms and networks for climate change technology transfer in Latin America and the Caribbean*, coordinated by the Inter-American Development Bank (IDB) and financed by the Global Environment Facility (GEF), promoted the development and transfer of technologies from CATIE's Ecosystem Management Chair (GECO), to contribute to reducing greenhouse gas emissions and vulnerability to climate change in the energy, transport, agriculture and forestry sectors

On the other hand, the project *Socio-ecological Restoration of climate-change resilient Forests, Landscapes and Ecosystem Services*, led by the **Chair of Ecology in Tropical Forest Management**, contributed to the resilience of landscapes and forests under high exposure to climate change that are found in protected areas of the Talamanca Mountain Range in Costa Rica.

These forests are of regional importance for their biodiversity and of national importance for the ecosystem services they provide to Costa Rican society. During 2019, the project consolidated the baseline for monitoring changes in the ecosystems, publishing three articles in international scientific journals and developing, in a participatory manner with the main actors, a plan for strengthening capacities to reduce the vulnerability of the ecosystems of the protected areas.

National forest resource monitoring systems

In 2019, work on national forest resource monitoring systems was carried out in Mexico, Brazil, Suriname, Costa Rica and the Dominican Republic, yielding the following outstanding actions:

- Software was developed for the automatic classification of remote sensing data, data management and applications for the web and mobile devices. These tools strengthen the capacities of countries to monitor losses and gains in forest and agroforestry areas and wood traceability.
- Networks of forest monitoring experts were piloted in collaboration with the Virtual Center of Excellence in Forest Monitoring, an initiative housed at the National Forestry Commission (CONAFOR) in Mexico. These networks make a decisive contribution to the necessary harmonization of countries' forest monitoring systems and the development of new approaches and tools.
- The Project strengthened technical capacities in beneficiary countries on the use of information technologies and artificial intelligence and contributed to the improvement of forest governance and transparency through the adoption of these technologies.



In addition, GECO consolidated its participation at the global, regional and national levels with technical and political actions related to high-carbon ecosystems, particularly blue carbon in mangroves. The GECO leader is co-author of the IPCC's Special Report on the Ocean and the Cryosphere in a Changing World (SCCR) and the contribution to this report was presented at the PreCOP, held in San José, Costa Rica, in 2019. GECO also maintained its participation in the Scientific Working Group of the International Blue Carbon Initiative and has provided technical assistance to the new Nordic countries' Blue Carbon Network based on the scientific and political experience generated in Central America and the Caribbean.

At the regional level, GECO conceptualized and designed the interdisciplinary and multisectoral *Mangroves for Development* project, which will begin in 2020, promoting transformational actions in coastal-marine landscapes of the northwestern Dominican Republic and promoting the inclusion of blue carbon and mangroves in the Nationally Determined Contributions (NDC). In addition, it contributed to the conceptualization of the regional strategy for the conservation of the mangroves of the Mesoamerican reef, responding to the needs of the Central American Integration System (SICA).

In Costa Rica, GECO in partnership with Conservation International (CI) completed a study of land use change and a prioritization of areas for restoration in the mangroves of the Gulf of Nicoya. CI will be working with GECO in 2020 and 2021 to restore mangroves in the country's Pacific region. Finally, training was provided to a large team from the Colombian government with the intention that Colombia could build its country position on blue carbon during COP25.

Finally, the Latin American Chair of Forestry Policy and Economics (CLAPEF) formulated a course for Ecuador, the Capacity Building Program in Proposal Formulation for Access to Climate Finance, which was offered virtually to train 49 people from public and private institutions, especially in access to resources from the Green Climate Fund (GCF).



Restoration and sustainable management of forests and forested landscapes

The Latin American Model Forest Network (RLABM) is a partnership between voluntary and cross-sectoral social platforms for the sustainable management of forests and landscapes, supported by government institutions in each member country and by international organizations such as the Center for International Forestry Research (CIFOR), the International Centre for Tropical Agriculture (CIAT), CUSO International and the Food and Agriculture Organization of the United Nations (FAO); and chaired by CATIE. Through these platforms, local leaders seek to implement the proposals and commitments of international conventions in their territories.

In 2019, the *Hileia Baiana* platform in Brazil joined the RLABM, bringing the total number of Model Forest initiatives to 33 in 14 countries. The study and systematization of their achievements and impacts was completed, showing their contribution to the consolidation of local natural resource governance, the promotion of sustainable practices, greater local participation in conservation actions, improvement of ecosystem services, and the impact of territories on public policies. The RLABM also held the workshop on Opportunities and Challenges of Model Forests in the context of land occupation and water management, under the framework of the Sustainable Development Goals (SDG) in Bolivia, where more than 50 leaders of territorial management processes strengthened their vision and capacities to face these challenges.

The project *Development of Sustainable Forestry Models and Links with the Private Sector for Secondary Forests*, with funding from the German government's IKI (hereafter the IKI project) represents the most recent milestone in CATIE's long and outstanding track record in the field of restored forests through secondary succession, and its ecological foundations.

In 2019, concrete progress was made in facilitating changes in public policy in El Salvador, Guatemala, Honduras and Costa Rica to generate enabling conditions for the management of secondary forests, building work agendas with forest authorities. In order to lead the development of business models and attract financing for secondary forest management, the technological challenge called *Constructon* was carried out and launched in Guatemala, seeking solutions for wooden housing. This project is also implementing secondary forest management demonstration areas in each of the countries of action, conducting research on forest growth and yields and the costs and benefits of management.

Strengthening capacities from the RLABM

With the 31st edition of the International Course on Forest Management: Governance and Legality in Forest Management and Restoration in the Tropics of Latin America and the Caribbean, held in 2019, more than 600 leaders and decision makers from institutions, programs, organizations and companies in the region have already been trained on the options and tools for sustainable forest management. Similarly, with the IV International Course on Forest Landscape Restoration, nearly 100 leaders of restoration projects and programs in several Latin American countries have been trained in methods to restore ecosystem services for human development. The course on Diversified Management of Natural Forests for officials of the National Council of Protected Areas (CONAP) contributed to the national analysis of the contribution to conservation and human development of forest concessions in Guatemala, while the First International Course on Methods and Tools for Community Forest Management (held in El Petén, Guatemala, and of which two other versions will be held in 2020) is training Latin American leaders in community forest management for integrated and inclusive development, based on the lessons and experiences shared directly by local actors in the Petén.

The Latin American Chair of Forest Policy and Economics (CLAPEF) completed the project *Green Transformations in the Global South (GreeTS)*, carried out jointly with the Technical University of Darmstadt in Germany, the School of Oriental and African Studies (SOAS) of the University of London and the Vietnamese Academy of Social Sciences. This project carried out a comparative analysis of Vietnam and Costa Rica of the enabling conditions and barriers to transformations for achieving a green economy in the land use and energy sectors. GreeTS generated more than 20 scientific publications and strengthened a knowledge network on the green economy related to the rural sector.

Finally, the use of drone technology in 2019 allowed better data to be obtained for the management of shade in cocoa plantations and the productive characterization of secondary forests. The Ecosystem Modeling Unit uses the most powerful platform currently available to collect and process geospatial data in real time, contributing to relevant projects such as the *Water Harvesting* project in Nicaragua.

The Ecology Chair consolidated a system for the massive import of field data obtained through the use of electronic devices. The database has eight independent studies of the effects of global change drivers on natural forests. Some of the studies date from the late 1980s and the database contains measurements for a total of 47 492 tree, palm, liana, and tree fern individuals, with 1,026 species counted. This initiative is a significant contribution to the region's knowledge of tropical forests and their responses to human intervention, including biodiversity and ecosystem services, and it has served to improve their management based on scientific evidence.

Fires in forests and productive landscapes

Forest fires are a constant threat and risk to tropical ecosystems and are expected to increase in frequency and number due to climate change, and to begin occurring in ecosystems such as wetlands where they did not occur naturally.

In response to this threat, research has been carried out on the effects of forest fires on tropical ecosystems, as well as various works related to forest fire susceptibility analysis of the vegetation, methods for assessing fuel loads, prediction of fire behavior for tropical fuels, and vulnerability and threat analysis to fires in tropical ecosystems. All these efforts will contribute to strengthening the capacities of countries to restore productive forests and landscapes during the current decade of restoration, in the face of high exposure to climate change.

Integrated watershed management and water security

In 2019, the Watersheds and Water Security Unit (UCSH) focused on consolidating and expanding the lines of research through master's thesis research, research and development projects, and the establishment of partnerships with research centers and universities to address the subject of watersheds. The implementation of the *Proresilience* project in Haiti, financed by the European Union and implemented with OXFAM, stands out. In this project, work was done on planning watersheds and community development, focusing on food security and assessing the resilience of these communities and their territories to the impacts of climate change and variability.

In addition, as part of the work approaches in watershed management, the following stand out: the development of the follow-up, monitoring and evaluation system of the *PROCUENCAS Panama* project (implemented by the Ministry of Environment); the drafting of the Management Plan for the Lake Atitlán Basin, Guatemala (requested by the Lake Atitlán Watershed Management Authority); and the development of the Territorial Management Plan for the Selle Massif watersheds in the southeast department of Haiti (financed by the United Nations Development Program-UNDP). Based on the implementation of these tools for the management and administration of hydrographic basins, in 2019 specific progress was made in facilitating and mediating for the change towards co-management of basins based on the institutionalization of this plan as a guide for the work of the Authority for the Management of the Lake Atitlán Basin, establishing enabling conditions for the sustainability of this basin, which is of great importance for tourism in Guatemala.

With the implementation of watershed planning methodologies in Haiti, the incorporation and adoption of the methodological guide for watershed co-management has been achieved (http://haitienvironnement.org/yahoo_site_admin/assets/docs/Guide.145103620.pdf), which has also served to introduce a farm planning methodology using a watershed approach, thus facilitating the homogenization of methodological processes in watershed management. Several international organizations use these methodologies, including UNDP and OXFAM.

In Panama, CATIE is leading the social and ecological components of the *Implementation of biodiversity monitoring and conservation actions in the Indio River basin* project, which focuses on supporting biodiversity conservation in the watershed.

In 2019, workshops were held with local stakeholders, forming community groups to implement the monitoring and implement the first community monitoring in the basin, thus facilitating the consolidation of a database.



Our strategic partners

CATIE has managed to strengthen its actions with the support of multiple local, national and international partners. Below, we highlight those with which various initiatives were developed in 2019, on the subject of forests, biodiversity, climate change and watersheds:

Universities

- Institute for Investigations and Forest Services of the National University of Costa Rica (UNA)
- School of Forest Engineering of the Technological Institute of Costa Rica (TEC)
- Technological University of Pereira, Colombia
- National School of Agrarian Sciences (ENCA), Guatemala
- National Institute for Forestry Sciences (NIFOS), South Korea
- University Mayor of Chile
- University of Idaho, United States

National or local governments

- National Conservation Area System (SINAC), Costa Rica
- Center for International Cooperation in Agronomic Research for Development (CIRAD), France
- Forest Ecosystems Observatory (OEFo), Costa Rica
- National Center for Geo-environmental Information (CENIGA), Technical Unit of the Ministry of Environment and Energy of Costa Rica
- National Monitoring System of Land Use, Cover and Ecosystems (SIMOCUTE), Costa Rica
- National Environmental Information System (SINIA), Costa Rica
- International Model Forest Network
- National Council of Protected Areas (CONAP), Guatemala
- National Forests Institute (INAB), Guatemala
- National Institute for Conservation, Forest Development, Protected Areas and Wildlands (ICF), Honduras
- National Forestry Institute (INFONA), Paraguay
- Forest Service of Peru (SERFOR)
- Autonomous Regional Corporation of Risaralda (CARDER), Colombia
- Governance of Santa Cruz de la Sierra, Bolivia
- Brazilian Agricultural Research Company (EMBRAPA)
- Brazilian Forest Service (SFB)
- National Forestry Corporation (CONAF), Chile
- Forestry Institute (INFOR), Chile
- Ministry of Environment of Colombia
- Ministry of Environment of Panama
- National Forest Financing Fund (FONAFIFO),

Costa Rica

- Canadian Forest Service
- National Forestry Commission (CONAFOR), Mexico
- Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA)
- French Development Agency (AFD)
- *Foundation for Forest Management and Production Control, of the Ministry of Spatial Planning, Land and Forestry, Surinam*

Civil society

- *Tropical Managed Forests Observatory (TmFo)*
- *World Resources Institute (WRI)*
- International Union of Forest Research Organizations (IUFRO)
- Fundatoledo, Hojanca, Costa Rica
- Action Fund, Colombia
- Madera Verde, Honduras
- CUSO, Canadá
- Association of Forest Communities of the Petén, Guatemala
- Association for Research and Integrated Development (AIDER), Peru
- College of Agronomy Engineers, Costa Rica

Private enterprises

- Foundation for the Development of the Central Volcanic Cordillera (FUNDECOR), Costa Rica
- Forest Development Commission of San Carlos (CODEFORSA), Costa Rica
- Tirimbina Biological Reserve, Costa Rica
- Foundation for the Conservation of the Chiquitano Dry Forest, Bolivia

International organizations

- United Nations Organization for Food and Agriculture (FAO)
- International Center for Tropical Agriculture (CIAT)
- *World Wildlife Fund (WWF)*, Panama
- Center for International Forestry Research (CIFOR)
- *World Agroforestry (ICRAF)*
- RAINFOREST ALLIANCE

Most relevant publications

- Turrén-Cruz, T; Benegas-Negri, L; Gutiérrez-Montes, IA; Brenes-Pérez, C. 2019. Evaluación de la vulnerabilidad ante eventos climáticos extremos, en La Paz, Baja California Sur; México. *CIENCIA ergo-sum*, 26(1):1-27. Papers in refereed scientific journals.
- Carrera, F; Rodas, A. 2019. Contribución de las concesiones forestales en Guatemala al cumplimiento de los Objetivos de Desarrollo Sostenible. XXV IUFRO World Congress. Papers in conference proceedings.
- Chacón, Mario. 2019. Resumen del estado del monitoreo forestal en Latinoamérica y el Caribe. Papers in conference proceedings.
- Corrales, L; Brenes, C; Fung, E; Betbeder, J. Evaluación de la infraestructura verde y conectividad ecológica en el cantón de Curridabat. Report and other publications.
- Corrales, L; Brenes, C. 2019. Estrategia Regional para el Manejo y Conservación de los Manglares en el Golfo de Nicoya-Costa Rica-2019-2030. Book and Monographs.
- Rozendaal, D; Bongers, F; Aide, MT; Alvaréz-Dávila, E; Ascarrunz, N; Balvanera, P; Becknell, JM; Bentos, TV; Brancalion, P; L. Cabral, GA; Calvo-Rodríguez, S; Chave, J; César, RG; Chadzon, RL; Condit, R; Dallinga, JS; De Almedia-Cortéz, JS; De Jong, B; De Oliveira, A; Denslow, JS; Dent, DH; DeWalt, S; Dupuy, JM; Durán, SM; Dutrieux, LP; Espírito-Santo, MM; Fandino, MC; Fernandes, GW; Finegan, B; García, H; Gonzalez, N; Granda-Moser, V; Hall, JS; Hernández-Stefanoni, JL; Hubell, S; Jakovac, CC; Hernández, AJ; Junqueira, AB; Kennard, D; Larpin, D; Letcher, SG; Licona, JC; Lebrija-Trejos, E; Marín-Spiotta, E; Martínez-Ramos, M; S. Massoca, PE; Meave, JA; G. Mesquita, RC; Mora, F; Muller, SC; Muñoz, R; Nolasco-De Oliveira-Neto, S; Norden, N; F. Nunes, YR; Ochoa-Ganoa, S; Ortiz-Malavassi, E; Ostertag, R; Peña-Claros, M; Perez-García, EA; Piotta, D; Powers, JS; Aguilar-Cano, J; Rodríguez-Buritica, S; Rodríguez- Velázquez, J; Romero-Romero, MA; Ruíz, J; Sánchez-Azofeifa, A; Silva- De Almeida, A; L. Silver, W; Schwartz, NB; Wayt-Thomas, W; Toledo, M; Uriarte, M; Valadares-Da Sá Sampaio, E; Van Breugel, M; Van der Wall, H; Martins, SV; M. Veloso, MD; M. Vester, HF; Vicentini, A; G. Vieira, IC; Villa, P; Williamson, GB; Zanini, KJ; Zimmerman, J; Poorter, L. 2019. Biodiversity recovery of Neotropical secondary forests (en línea). *Science Advances* 5(3). Consultado 04 mar. 2020. Disponible en DOI: 10.1126/sciadv.aau3114
- Ministerio del Ambiente de Haití, PNUD, CATIE (Benegas, L., Faustino, J., Watler, W.J.). 2019. *Guide Méthodologique pour l'Élaboration des Plans de Gestion des Bassins Versants d'Haïti*. Publicación Técnica.
- Serrano-Molina, JJ; Delgado, D; Esquivel, MJ; Morales-Aymerich, JP. 2019. Guía didáctica para la silvicultura de bosques secundarios y degradados de Centroamérica (en línea). Serie Técnica. Manual Técnico 14. Consultado 04 mar. 2020. Disponible en <http://repositorio.bibliotecaorton.catie.ac.cr/handle/11554/9101>
- Veintimilla, D; Ngo Bieng, MA; Delgado, D; Vilchez-Mendoza, S; Zamora, N; Finegan, B. 2019. Drivers of tropical rainforest composition and alpha diversity patterns over a 2,520 m altitudinal gradient (en línea). *Ecology and Evolution* 9(10):5720-5730. Consultado 04 mar. 2020. Disponible en <https://onlinelibrary.wiley.com/doi/full/10.1002/ece3.5155>
- Villalobos-Soto, R; Bustos, E; Carrera-Gambeta, F; Delgado, D; Zamora, R. 2019. Elementos críticos para la restauración a escala de paisajes, desde experiencias de los bosques modelo (en línea). Papers in conference proceedings. Consultado 04 mar. 2020. Disponible en <http://repositorio.bibliotecaorton.catie.ac.cr/handle/11554/9217>

Stories of Success:

Gustavo Pinelo, an agent of change in community forestry management in Guatemala, considers CATIE to be a promoter of sustainable forestry development in the Petén.

“CATIE’s contribution can be seen from different points of view. Among the most impacting is the research that began with the design and installation of experiments in permanent plots for measurement to learn about the dynamics of the Petén forest. This research has closed a cycle by providing scientific data, ensuring with some degree of certainty the long-term permanence of the five timber species with the greatest volumetric contribution in the forest concessions of the multiple use zone of the Maya Biosphere Reserve. Furthermore, in terms of forest management, CATIE was the first school to ensure the conservation and good management of the Petén forest, publishing technical forestry and environmental elements that now serve as support in several countries. But what has been transcendental is accompanying forestry concession process, which is clearly a globally recognized success, with ample possibilities for replication”.



CATIE IN THE REGION

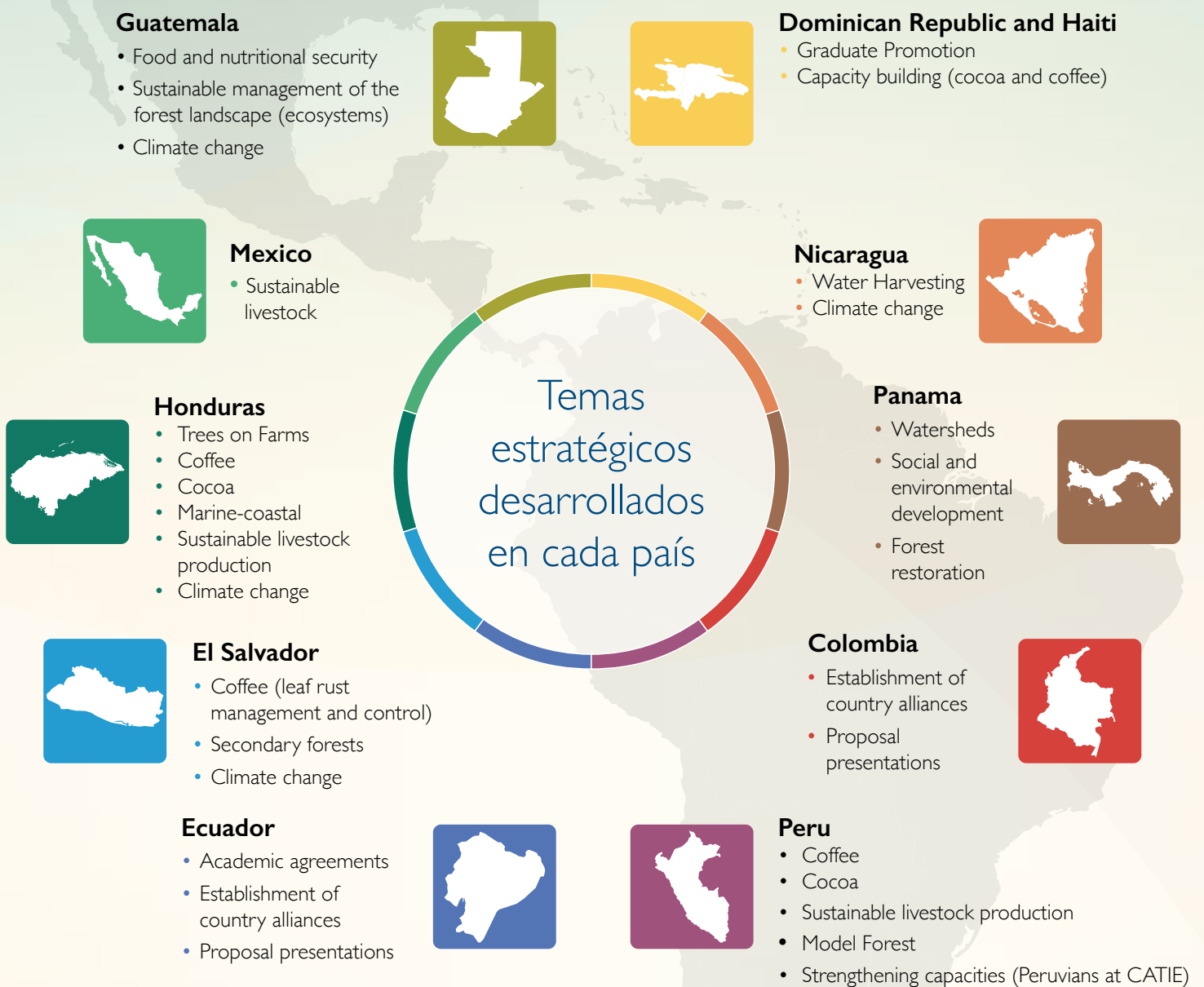
Addressing the demands of the region

CATIE's mandate focuses on supporting countries in the region to develop sustainable and inclusive management of agriculture and natural resources.

In 2019, the institution, with the support of various partners and donors has worked on multiple projects and capacity building processes on key issues, which meet the demands of the region. Among the actions developed in the countries, the transfer of technology and knowledge and the impact on policies at different scales stand out, contributing to poverty reduction and the economic, social and environmental development of the region.

The following is a summary of these actions in the countries.

Strategic themes developed in each country



Strengthening capacities

Thematic areas	Country													
	Belize	Bolivia	Chile	Colombia	Costa Rica	Ecuador	Guatemala	Honduras	Jamaica	Mexico	Nicaragua	Panama	Peru	
Climate change (adaptation, mitigation, financing)														
Protected Areas, biodiversity														
Climate-smart Agriculture														
Sustainable silvo-pastoral, and low-emission livestock production														
Natural resource management and administration														
Watershed management														
Geographic information systems														
Coffee and cocoa agroforestry systems														
Value chains														
Alternative conflict resolution														
Forests, restoration														
Sustainable Development Goals														
Biostatistics														
Environmental economics and environmental services														

Belize	Bolivia	Chile	Colombia	Costa Rica*
66	46	21	20	1087

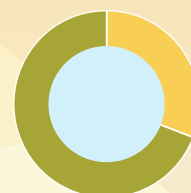
Ecuador	Guatemala	Honduras	Jamaica
49	21	69	11

Mexico	Nicaragua	Panama	Peru
4477	88	1598	530

Number of professionals trained per country

8083

persons trained by CATIE



69% men



31% women

* Note: In the case of Costa Rica, the figure reflects the professionals who come to train at CATIE's headquarters in Turrialba, Costa Rica. They represent 26 countries in total.

The Tropical Agricultural Research and Higher Education Center (CATIE) is a regional center dedicated to research and graduate education in agriculture, and the management, conservation and sustainable use of natural resources. Its members include Belize, Bolivia, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Venezuela and the Inter-American Institute for Cooperation on Agriculture (IICA).



Solutions for environment and development
Soluciones para el ambiente y desarrollo