

COURSE REPORT

Training of Trainers: Ecological Restoration *Strategies for Agricultural Landscapes of Panama*

District of Macaracas, Province of Los Santos, Panama
January 23-24, 2023

A field course organized by:

The Environmental Leadership & Training Initiative (ELTI) and the Save a Tree Live Better Ecological Producer's Association (SAVIM), in collaboration with the United States Peace Corps



Participants learn how transplant native tree seedlings into nursery bags.

Background: The Republic of Panama is known for providing a critical link in global trade via the Panama Canal and its impressive economic growth within Latin America. Despite this progress, Panama suffers from stark economic disparities. Extreme poverty is still high in rural areas at 27%, while indigenous territories are above 40%¹. Economic opportunities in rural areas are sparse and landowners often rely on conventional agriculture and cattle ranching practices that involve the cutting and burning of forests to plant annual crops and pasture grasses. When practiced on marginal, steeply sloped land, soils quickly erode and lose fertility, leading to low agricultural production, decreased ecosystem integrity, and few social benefits. As a result, the Food and Agriculture Organization (FAO) (2014)² estimates that 27% of Panama's agricultural lands are dry and degraded, which severely impairs the ability of these areas to generate the range of ecosystem services necessary to support sustainable production systems including soil fertility, provision of water, carbon sequestration, and biodiversity.

1. World Bank Panama Profile: <http://www.worldbank.org/en/country/panama/overview>

2. Panama America (11/20/2014): <http://www.panamaamerica.com.pa/economia/27-de-deterioro-registran-algunas-tierras-del-pais-953263>

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Participants visit a silvopastoral system and discuss the benefits and challenges.

Given this context, rural landholders can benefit from capacity building and access to information about more sustainable land use practices, especially considering changing climatic conditions. Invited by the Panamanian Government, the United States Peace Corps helps to address this need by sending professionals to “serve as Peace Corps Volunteers (PCVs), who work at the grassroots level toward sustainable change that lives on long after their service³.” Volunteers are assigned for a two-year period to rural communities that request assistance from the Peace Corps. The cultural exchange and development assistance that PCVs provide is critically important for improving human capacity, providing better opportunities for rural people, and sharing goodwill between countries. To strengthen the technical background of PCVs from the Community Environmental Conservation sector in their role as environmental conservation extension agents, ELTI delivered a “training of trainers” (TOT) course, which was facilitated as part of the Peace Corps Panama’s “In-Service Training,” a two-week technical training offered to PCVs after serving three months in their respective communities.

Course Objectives: The general objective of this training of trainers (TOT) course was to provide PCVs with the basic knowledge and skill sets needed to facilitate forest restoration strategies with community counterparts in their host sites. Since the communities are comprised of a mosaic of agriculture and cattle ranching systems, the course focused on introducing a range of strategies that can help to restore ecological function for more climate resilient agricultural landscapes. The course also focused on providing PCVs with the tools to disseminate and train others on how to utilize restoration knowledge and skills.

3. United States Peace Corps Website: <https://www.peacecorps.gov/volunteer/>



Catelyn De Leon describes the activities to establish and manage a shade coffee agroforestry system.

Content: The course was divided into three training modules, illustrated through introductory lectures, field-based demonstrations, and group exercises facilitated by ELTI staff and local experts:

Module 1: Forest ecology, disturbance, and degradation

Module 2: Forest restoration and regenerative agriculture strategies

Module 3: Technical approaches to native tree species propagation and reforestation

Module 4: Effective approaches to communicate restoration to rural communities

Field-Course Format: The course took place over two days. The first day focused on introductory presentations, followed by a day of field-based activities. The course included the following specific activities:

Participants visited the town of El Calabazo, where they were greeted by the Save a Tree Live Better (SAVIM) Ecological Producer's Association, a community association and ELTI alumni. Diosa Castro, SAVIM's Secretary, presented about the group's history of implementing forest restoration, recycling, and natural resource management projects. The participants learned about the perspective of local people regarding environmental conditions and effective restoration strategies that they have adopted in their farms and communities.

Jacob Slusser, Panama Coordinator, described ELTI's efforts to support people to restore tropical forests in Panama and specifically, ELTI's long-term support of SAVIM to implement community based natural resource management and sustainable ranching projects. Afterwards, Jacob presented on tropical forest ecology and restoration approaches, which covered both theoretical and practical methods of restoration in agricultural landscapes. The presentation also included case studies and practical approaches to effectively communicate forest restoration concepts and practices to landowners.



Diosa Castro presents an overview of SAVIM's restoration activities.



Participants practice filling nursery bags with substrate composed of organic soil, rice husk and organic fertilizer.

Volunteers discussed the barriers they have faced to communicate conservation themes in their communities and received feedback on how to overcome them.

After the presentations, PCVs visited the cattle farm of Leonardo Gutierrez, who discussed the history and objectives of his farm, detailing how he transformed his farm from conventional to silvopastoral practices. Participants were given a tour of the farm by Leonardo, visiting several restoration strategies and new technologies implemented, such as a solar powered cattle aqueduct system, forage bank, intensive silvopastoral system and native species reforestation of degraded hilltops. During the visit, Leonardo addressed many of the challenges and lessons learned from implementing restoration and silvopastoral systems. Jacob also provided additional insight about regenerative strategies that facilitate production in harmony with nature. He emphasized integrating multi-purpose native tree species to facilitate soil and water conservation, which improves overall farm resiliency.

Next, PCVs visited the farm of Catelyn De Leon, where they learned about a multi-strata shade coffee agroforestry system. Catelyn described the different species, their role in the system and how the silvicultural management they require, such as pruning, thinning and fertilizing. She discussed the integration of green manures, high species richness, and pollinator attracting species, which help to improve soils, increase fruits species pollination, and facilitate integrated pest management. Catelyn also discussed how she utilizes the harvests for household consumption and sale in local markets. PCVs were impressed with the 40+ different species integrated into the small quarter hectare system. Jacob reiterated the importance of integrating high plant species richness within multiple strata, which mimics the natural tropical forest ecosystem and therefore lessens the dependency on outside inputs and increases farm resiliency to climate change. Jacob also discussed simple and practical methods to explain ecological and regenerative practices to local landowners.

The visits provided participants with smallholder's perspective on restoration and alternatives to conventional livestock



Jorge Gutiérrez

Jacob Slusser discusses tree planting best practices.

and agriculture and the types of strategies that farmers have adopted that enhance their traditional livelihoods and meet food security. Volunteers became more familiar with the technical components, especially the tree and shrub species that are utilized in silvopastoral and agroforestry systems. It was also an opportunity for PCVs to learn how local farmers communicate the use ecological approaches and how they can disseminate technical concepts in a practical way to the farmers in their communities.

After lunch, participants visited the SAVIM nursery, which has produced native tree species since 2011. Jacob reiterated that reforestation should always be the last option when developing a forest restoration strategy due to its complexity and high cost in terms of time and resources. Jacob started by leading a session about the factors to consider and steps to construct a small-scale community tree nursery. Next, PCVs constructed a seed germinator bed, learning about different species, their phenology, seed types, storage, and scarification processes. Once the bed was constructed and disinfected, participants practiced scarifying and planting seeds. Participants also learned to make substrate and fill nursery bags. Finally, participants transplanted seedlings from the seed germinator bed into

prepared bags. To conclude the nursery session, Jacob stressed the importance of carefully selecting tree species for reforestation projects based on their ecological and social importance, since selected tree species must be able to function in degraded site conditions as well as have value for local people.

Jacob led a reforestation session to demonstrate different tree planting techniques and had participants plant trees in a designated riparian area of a local farm. Jacob also focused on practical strategies to establish different reforestation plots and sizes, utilizing simple tools such as a roll of twine and lightweight three-meter PVC tubes to quickly and accurately measure out planting distances. Afterwards, Jacob discussed best planting practices, specifically calling attention to digging 40-centimeter holes to breakup compact soils and planting saplings with high amounts of organic material or with nearby forest soils which contain beneficial microorganisms. He also discussed post-planting maintenance including fertilizing, mulching, and digging mini-swales and barrier walls for sediment and water catchment as well as more long-term silvicultural management via pruning and thinning. Participants then practiced planting fruit trees and received feedback.

The course finalized with an open discussion where PCVs shared challenges to conduct conservation and restoration efforts in their communities. Jacob facilitated a brainstorming session on ways to overcome these challenges and methods ELTI utilizes to synthesize restoration science into practical terms.



Participants practice sifting soil before making nursery substrate.

Participants: This course was developed for Peace Corps Volunteers (PCVs) serving in Panama as extension agents in the Community Environmental Conservation (CEC) sector. PCVs serve for two years in rural communities of Panama, assisting landholders and local groups in designing, planning and implementing biodiversity conservation and forest restoration projects. The three PCVs that attended the training are part of the first group of volunteers who returned to Panama since the COVID-19 pandemic led to the worldwide evacuation of volunteers in March 2019.

The course was developed and facilitated by Jacob Slusser, ELTI's Neotropics Training Program Panama Coordinator, with the assistance of Jorge Gutierrez, ELTI's Field Technician. SAVIM members Diosa Castro, Leonardo Gutierrez and Catelyn De Leon, facilitated an introductory presentation and farm visits and Peace Corps Panama CEC Staff Members Francisco Santamaría, Leyla Wittgreen and Sara Caez Rivera also assisted in sessions during the training.

Outcomes and Follow-up: Participants were actively engaged throughout the course and were grateful for the opportunity to receive practical training on forest restoration strategies, which is of high interest in their communities. Participants rated the course 4.9 out of 5. The PCVs expressed interest in attending ELTI's 5-day forest restoration course with a community counterpart. Additionally, PCVs discussed the possibility of visiting ELTI's model silvopastoral network in the Santa Maria River Watershed with a community counterpart and facilitate a "farmer to farmer" learning opportunity and create more awareness about ecological alternatives for agriculture and livestock systems.

This event was possible thanks to Arcadia, whose Environmental Conservation grants support programmes that protect and enhance biodiversity, and provide field training and academic research.