

COURSE REPORT

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

District of Macaracas, Province of Los Santos, Panama
September 5-6, 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 establish a shade coffee agroforestry system as a capstone project of the training.

Background: The Republic of Panama is known for providing a critical link in global trade via the Panama Canal and its impressive economic growth. 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 and overuse of agrochemicals

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

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Edelmira Navarro, President of SAVIM, presents an overview of SAVIM's restoration activities.

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.

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 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

2. Panama America (11/20/2014): <http://www.panamaamerica.com.pa/economia/27-de-deterioro-registran-algunas-tierras-del-pais-953263>.
3. United States Peace Corps Website: <https://www.peacecorps.gov/volunteer/>



Jacob Slusser discusses the components of a silvopastoral system in comparison with conventional ranching systems.

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 forest restoration practices.

Content: The course was divided into four training modules, illustrated through introductory lectures, field-based demonstrations, and group exercises facilitated by ELTI and SAVIM members:

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 others

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 consisting of ELTI alumni. Edelmira Navarro and Diosa Castro, SAVIM's President and Secretary, respectively, 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 strategies that they have adopted on their farms and communities.

Jacob Slusser, Panama Program 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 restoration and sustainable ranching projects. Afterwards, Jacob presented on tropical forest ecology and restoration strategies, which covered both theoretical and practical methods of restoration in agricultural landscapes. The presentation also included case studies and practical approaches to effectively commu-



Participants work together to sift soil before preparing substrate.



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

nicate forest restoration concepts to landowners. 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 Edelmira Navarro, who discussed the history and objectives of the farm, detailing how she and her husband transformed the farm from conventional to silvopastoral practices. They visited 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 hillsides. During the visit, Edelmira 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



Jacob Slusser

Participants utilize practical tools to lay out a shade coffee agroforestry system.

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 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, shrub, and plant 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 in collaboration with SAVIM members discussed the steps to construct a small-scale community tree nursery. Next, participants 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 seeds and varied planting practices. Participants also learned about making substrate and practiced mixing and filling bags. Finally, they transplanted seedlings from the seed germinator bed into prepared bags and learned how to care for seedlings until planting. 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 final session to demonstrate the design of restoration systems and different tree planting techniques. Jacob focused on 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 practiced using measurement tools and planting coffee tree saplings in the understory of a mahogany plantation to establish an agroforestry system.

To conclude the course, PCVs raised doubts on how 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 pose for a group photo during a model farm visit.

Participants: This course was developed for 19 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 course was developed and facilitated by Jacob Slusser, ELTI's Neotropics Training Program Panama Coordinator. SAVIM members Diosa Castro, Edelmira Navarro and volunteer member Catelyn De Leon, facilitated an introductory presentation, farm visits, and native species propagation techniques. Peace Corps Panama CEC Staff Members Francisco Santamaría, Leyla Wittgreen and Sara Caez Rivera also assisted 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 a 5 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 farm networks with a community counterpart, to learn how other landowners have adopted restoration strategies.

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