

COURSE REPORT

Agroforestry and Ecological Restoration for Agricultural Landscapes

ELTI Training Landscapes
District of Pedasí, Province of Los Santos
July 8-17, 2024

A field course organized by:

The Environmental Leadership & Training Initiative (ELTI), the Association of Livestock and Agrosilvopastoral Producers of Pedasí (APASPE), and the United States Peace Corps



Participants conduct an enrichment planting with native tree species within a living fence.

Background: The Republic of Panama provides a critical link in global trade via the Panama Canal and is one of the fastest growing economies of Latin America. However, Panama suffers from stark economic disparities. Extreme poverty is common in rural areas, especially indigenous territories. Economic opportunities are sparse, and landowners often rely on conventional agriculture and cattle ranching practices that involve the

ELTI is an initiative of:

Yale SCHOOL OF THE ENVIRONMENT
The Forest School



Participants sift soil before making substrate to fill nursery bags.

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, resulting in low agricultural production and biodiversity loss. Consequently, a third of Panama's agricultural lands are highly degraded, severely impairing ecosystem services such as soil fertility, provision of water, carbon sequestration, and biodiversity - all of which enable human wellbeing. While advances in ecological practices such as agroforestry have been shown to enhance biodiversity and productivity in farms, they are uncommon due to the lack of knowledge and accessible information available.

Given this context, rural landholders can benefit from capacity development about sustainable land use practices to adapt to climate change. Invited by the Panamanian Government, the United States Peace Corps helps to address this need by sending professionals to "work at the grassroots level toward sustainable change that lives on long after their service (USPC 2017)." Peace Corps volunteers (PCVs) are assigned for a two-year period to rural communities that request Peace Corps assistance and work in collaboration with Panamanian partners.

The cultural exchange and development assistance that PCVs provide is critically important to empower rural people to make informed and sustainable decisions.

ELTI offered this field-based course to both PCVs, and their respective community counterparts interested in conducting restoration activities. It was facilitated at ELTI's Training Landscape, a network of field sites that include applied research projects, demonstration trails, field exercises, and model farms with local landholders, located in the Los Santos Province of Panama's Azuero Peninsula. ELTI's field courses are organized around the components of the training landscape so that participants can learn in a practical and hands-on manner.

Course Objectives: To train participants on the role that forests play in providing ecosystem services and the range of agroforestry activities that can be integrated into agricultural and livestock landscapes to enhance biodiversity and traditional livelihoods.



Participants measure and flag planting areas for a hillside agroforestry system.

Content: The material was divided into four thematic modules, which included introductory lectures with corresponding field-based visits facilitated by ELTI affiliates and APASPE members, as follows:

Module 1: Tropical forest ecology and ecosystem services

Module 2: The range of ecological restoration strategies

Module 3: Integrating ecological restoration into agricultural production (agroforestry and silvopasture)

Module 4: Development of a farm management plan

Field-Course Format: This course took place over two days at ELTI's training landscapes. A total of three separate groups participated in a two-day course, which consisted of introductory lectures followed by technical demonstrations, applied exercises, visits to model farms, group reflection, and capstone project (a farm management plan). The model farms visited varied in biophysical and socio-economic contexts and demonstrated a range of agroforestry and restoration approaches. The following activities occurred throughout the week:

Day 1: Jacob Slusser (Panama Coordinator) in collaboration with Peace Corps personnel welcomed the participants and facilitated introductions and an icebreaker. Slusser then presented a lecture about ELTI and the objectives of the course, followed by an introductory presentation about agroforestry and ecological restoration. The presentations explained how tropical forests function and produce ecosystem services, the range of forest restoration strategies, and the principles of agroforestry systems.



Jacob Slusser

Participants learn technical methods to plant agroforestry green manure species.

After lunch, participants traveled to Los Asientos, to learn technical agroforestry skills, such as: construction of a small nursery, propagate native tree species, and design and establish agroforestry and silvopastoral systems. To start, Slusser quizzed participants on the factors and site considerations to create a nursery. Next, they learned about tree seed types, harvesting techniques, storage, and scarification processes, and then practiced seed germination treatments and sowing methods. Participants learned how to make substrate and fill nursery bags and other containers. Finally, they transplanted seedlings from the seed germinator bed into prepared bags. To conclude the nursery session, Slusser reiterated examples of common mistakes and best management practices.

Next, Slusser led a session on technical approaches to establish and manage agroforestry systems. Utilizing an APASPE model farm, he asked participants to rate the agroforestry systems based on the principles discussed during the introductory lecture. Participants discussed the strengths and weaknesses of each system and brainstormed on ways to enhance them through enrichment planting and management. Next, Slusser demonstrated how to select species based on their functional and site adaptability characteristics – which ensures that the right species is planted in the right place at the right time. Slusser then demonstrated how to measure spacing for agroforestry systems in hillsides, via an A-level to mark contour lines and three-meter poles to measure a triangular planting pattern. Both techniques effectively facilitate soil and water conservation on steep slopes. Participants were tasked to use the tools to measure an area to be planted with one hundred agroforestry species.

Afterwards, Slusser demonstrated effective tree planting practices in terms of sapling size requirements, site selection, hole depth, and fertilizer types. Participants were then tasked with selecting specific tree species to improve a shade coffee agroforestry system and a beef cattle silvopastoral system. Slusser provided feedback on their selections and planting techniques. Finally, Slusser demonstrated maintenance practices such as mulching, fertilizing, pruning, and thinning. Slusser concluded the session by reflecting on the day's themes and answered pending questions.



Participants learn about water systems powered by simple solar pumps.

Day 2: The second day of the course focused on learning about agroforestry directly from local landowners, who are also APASPE members and ELTI alumni. After breakfast, participants traveled to the small town of Los Asientos to meet APASPE's members and visit the El Ñopo Farm of Odielca Solís, APASPE Secretary. Participants were given a tour of the farm by Odielca, visiting several restoration strategies and new technologies including a solar powered cattle aqueduct system, drip irrigation agroforestry system with shade coffee, fruit orchard, forage bank, intensive silvopastoral system, restoration of stream banks, and a reforested wildlife corridor. During the visit, Solís discussed many of the challenges and lessons learned from implementing restoration and sustainable ranching activities over the past five years. Participants were very impressed of the productive results from such a small farm and inspired by Solís's message of perseverance and faith in ecological practices.

Next, participants visited the Los Yescos Farm and received a tour by owner and APASPE member, Dolores Solís. Solís explained the history of the farm and how he did not originally believe that agroforestry practices were beneficial. Through his involvement in APASPE, Solís received training from ELTI and Peace Corps Volunteers. He explained that with the on-farm assistance he became more confident experimenting with agroforestry practices and began converting his conventional farm to a more regenerative one. Participants visited a range of restoration strategies, such as a shade coffee and fruit tree agroforestry system, silvopastoral systems with timber species, and an agro-successional system that integrated timber, agricultural crops and cattle forages. Participants were impressed with the simple solar powered water system that pumped water from a small pond and distributed it throughout the farm to cattle water troughs and irrigation use. Solís emphasized that dedication is needed to implement and manage agroforestry systems, and encouraged the PCV counterparts to work with Peace Corps Volunteers as they provide useful support and inspiration.

After the farm visits, participants returned to Pedasi to develop their farm management plans. Slusser provided an introductory lecture on the ten-step process, including: drawing a farm map, analyzing and rating their current farm via ten ecological and productive indicators, planning restorative activities to resolve farm problems, the materials and actions to be conducted, and then creating a farm map to illustrate planned interventions. Volunteers and community counterparts worked together and presented their plan – each group receiving feedback from their peers and Slusser. Afterwards, Slusser and Peace Corps personnel presented certificates to the participants during a graduation ceremony and a group photo was taken.



A group photo of the participants and facilitators at the conclusion of the course.

Instructors and Coordinators: The course was facilitated by ELTI affiliate Jacob Slusser (Panama Coordinator) and APASPE members Odielca Solís and Dolores Solís. Slusser delivered introductory lectures and field demonstrations on the concepts of ecosystem services, forest ecology, restoration strategies and agroforestry systems. Solís and Solís facilitated model farm visits, demonstrated agroforestry practices, and answered participant questions.

Participants: The course was offered to 46 Peace Corps Volunteers and their community counterparts (landowners).

Outcomes and Follow-up: Participants were actively engaged throughout the course and were grateful for the opportunity to receive practical training on agroforestry strategies. Participants rated the course a 4.8 out of 5. Peace Corps volunteers will assist their counterparts to implement their farm management plans. Depending on follow-up support needs, ELTI will provide additional training or technical visits.

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.