Environmental Leadership & Training Initiative

COURSE REPORT

Ecological Restoration Strategies in Agricultural Landscapes of Panama

Province of Herrera, Panama
September 10-12, 2017

A field course organized by:
The Environmental Leadership & Training Initiative (ELTI) and the United States Peace Corps

. Photo: Sara Caez-Rivera

Peace Corps Volunteers and local landowners during a tree planting exercise.

Background: The Republic of Panama is known for providing a critical link in global trade via the Panama Canal, as well as its impressive economic growth in Latin America. Despite this progress, Panama suffers from stark regional 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 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

ELTI is an initiative of:

Yale SCHOOL OF FORESTRY & ENVIRONMENTAL STUDIES

In collaboration with:

Smithsonian Tropical Research Institute PANAMA

Peace Corps Volunteers fill bags with prepared substrate before transplanting nursery seedlings.

Given this context, rural landholders can benefit from capacity building and access to information about more sustainable land use practices, especially in light of 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 (PCV), who work at the grassroots level toward sustainable change that lives on long after their service[3] ." Volunteers are assigned for a two-year period to rural communities that request Peace Corps assistance. The cultural exchange and development assistance that PCV's provide is critically important for improving human capacity and providing better opportunities for rural people.

To strengthen the technical background of PCV's in their role as environmental conservation extension agents, ELTI delivered a "training of trainers" course, which was facilitated as part of the Peace Corps Panama's "In-Service Training," a two-week technical training offered to PCV's after serving six months in their respective communities.

Course Objectives: The general objective of this course was to provide PCV's with the basic knowledge and skill sets needed to conduct 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 goal of the course was to introduce a range of strategies that can help to restore ecological function in order to create landscapes that are more resilient to climate change.

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

Module 1: *Forest ecology and the provision and regulation of ecosystem services*
Module 2: *Deforestation and forest degradation*
Module 3: *Strategies for the restoration of ecosystem services in human-modified landscapes*

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

Jacob Slusser discusses best practices for nursery establishment.

Field-Course Format: This course took place over three days. The first day focused on introductory presentations, followed by two days of field-based activities. Due to the size of the group, the 24 participants were split into two groups, each group corresponding to one day in the field. The course included the following specific activities:

Day 1: Participants traveled to the Montuoso Forest Reserve located in the Herrera Province of Panama to visit a mature reference forest. Participants were led by Panamanian Environmental Ministry park rangers via interpretative trails, explaining the importance of the forest to protect the headwaters of the La Villa River, the most important water source for the Azuero Peninsula. The field visit was followed by an introductory presentation about ELTI capacity development efforts, facilitated by Jacob Slusser (Panama Coordinator). Next, Jacob facilitated a comprehensive presentation about forest restoration strategies, which covered both theory and practical methods of restoring forests in human-dominated landscapes.

Day 2: Jacob led a tree species identification walk to train PCVs on how to identify diverse species found in both agricultural landscapes and riparian areas. Jacob also focused on teaching the traditional uses, functional characteristics and phenology of species, so that PCVs could understand how to adequately select species for different restoration endeavors. In addition, the activity focused on how forests function and produce ecosystem services in different landscapes. Participants visited and learned the differences between conventional agricultural systems and sites demonstrating agroecological practices including agroforestry and silvopastoral systems.

For the second activity, Jacob led a session about how to construct a small-scale community tree nursery. Before commencing, Jacob reiterated that reforestation should always be the last option when developing a forest restoration strategy due to its high cost in terms of time and resources. To start, objectives and site considerations for nurseries were discussed. Next, PCVs constructed a seed germinator bed, learning about different seed types, storage and scarification processes. Once the bed was constructed and disinfected, participants practiced scarifying seeds and different seed planting practices. Participants also learned about making substrate for nursery bags and practiced mixing and filling bags. Finally, participants practiced

Photo: Sara Caez-Rivera

Participants widening a riparian buffer zone by planting native tree species.

transplanting seedlings from the seed germinator bed into prepared bags. To close the session, Jacob stressed the importance of carefully selecting tree species for reforestation projects based on their ecological and social importance, since species have to function in degraded site conditions and must also have value for local people.

After lunch, Jacob led a field-based session to demonstrate different tree planting strategies and have participants plant trees on the farm of local landowners. Two areas had been pre-selected and prepared for reforestation: (1) line-planting in a degraded area, and (2) an enrichment planting in a young secondary riparian forest. The session began with the landowners describing their farms and their individual objectives and interests in tree planting within the selected area. Next, Jacob demonstrated practical strategies for establishing a reforestation plot, utilizing simple tools such a roll of twine and lightweight three-meter PVC tubes to quickly and accurately measure tree planting distances. Afterwards, Jacob discussed best planting practices, specifically calling attention to digging 40-centimeter holes in order to break hardpan and planting saplings with high amounts organic compost or material from nearby forests. He also discussed post-planting maintenance including fertilizing, mulching, and digging mini-swells for sediment and water catchment. Participants then worked in teams to plant 50 trees in the two sites utilizing the methods they had learned.

Day 3: The same field-based activities were conducted for the second group of 12 participants, except that the tree planting was conducted with a different landowner and focused on: (1) enrichment planting to further develop an agroforestry system, and (2) enrichment planting within a living fence to establish a windbreak component for a silvopastoral system.

At the conclusion of both days, participants completed course evaluations.

Participants learn about species composition in a riparian forest during a tree identification walk.

Participants: This course was developed for 24 Peace Corps Panama Volunteers serving as extension agents in the Community Environmental Conservation sector. These PCVs serve for over two years in rural communities of Panama, assisting landholders and local groups in designing, planning and implementing biodiversity conservation and forest restoration practices.

The course was developed and facilitated by Jacob Slusser, ELTI's Neotropics Training Program Panama Coordinator, with the assistance of Peace Corps Panama staff and local landholders.

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 4.9 out of 5. Many PCVs expressed interest in attending ELTI's 5-day forest restoration course offered at the Azuero focal training sites. In addition, PCVs discussed possible ideas for participating in ELTI's Leadership Program in order to develop restoration projects in their communities.

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.