

COURSE REPORT

Ecological Restoration Strategies for the La Villa River Watershed

ELTI Training Landscapes
District of Pedasí, Province of Los Santos
September 23-27, 2019

A field course organized by:
The Environmental Leadership & Training Initiative (ELTI)
and the Association of Livestock and Agrosilvopastoral Producers of Pedasí (APASPE)



Photo: Eli Wittum

Participants learn how to make simple soil observations in order to diagnose a degraded site and develop a restoration strategy.



ESTRATEGIAS PARA
LA RESTAURACIÓN ECOLÓGICA

Background: The Azuero Peninsula is one of Panama's most deforested regions. Panama's Action Plan for the Fight Against Drought and Desertification classifies around 70% of the Azuero as dry and vulnerable to degradation. Within the Azuero Peninsula, the La Villa River Watershed (LVRW) is a place that deserves special attention. This watershed is a vital natural resource that provides potable water to over 200,000 residents in three major cities, as well as water for crops and cattle production. But with the loss of over 78% of the LVRW's forest cover due mostly to conventional agriculture and ranching practices, farmers are experiencing shortages of water for human consumption, crops and livestock. Without adequate tree

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Photo: Eli Wittum

A participant with rosewood seedlings harvested from a mature tree, which will be transplanted into a nursery until planting in the field.

cover and with the widespread use of agrochemicals, water that would have filtered through the watershed now carries sediments and agricultural runoff downstream. The consequences include contaminated water supplies, decreased agricultural productivity and increased vulnerability to changing climatic conditions.

For farmers living within the LVRW there remains little accessible information, training or incentives for them to adopt more sustainable land use practices. Sustainable land management alternatives exist, such as silvopastoral systems (SPS), which are a form of agroforestry that integrate trees, forage shrubs and livestock production and do not require agrochemical inputs. These systems are particularly appealing since they enable farmers to maintain and enhance traditional livelihood practices in a more environmentally sustainable manner. Yet current capacity development opportunities within the LVRW focus on enhancing conventional management approaches through increased agrochemical use and technologies that are not aligned with the local culture.

Over a period of five days, this course provided the practical basis to understand how to implement forest restoration strategies in cattle ranching landscapes via SPS. This field course was facilitated in ELTI's

Training Landscapes in Azuero, which convey ecological principles through its interpretative trail network and demonstration sites. This course was offered to landowners and extension agents working in the La Villa River Watershed (LVRW), who will be receiving follow up training and mentoring to implement silvopastoral model farms in their communities.



Photo: Eli Wittum

Participants study the presence of soil macrofauna in forest soils to better understand the benefits of biodiversity for soil conservation.

Course Objectives: The overall goal of the course was to educate participants on the role that forests play in providing ecosystem services and the range of forest restoration strategies that can be integrated into agricultural and livestock landscapes in order to conserve important water sources while also enhancing production.

Content: The course was divided into six training modules, illustrated through introductory lectures, field-based demonstrations, and group exercises facilitated by ELTI staff and APASPE members, as follows:

Module 1: *Forest ecology and ecosystem services*

Module 2: *Forest degradation and limitations for restoration*

Module 3: *Strategies for restoring ecosystem services in cattle ranching landscapes*

Module 4: *Sustainable cattle ranching: Environmental and productive contributions*

Module 5: *The role of community associations in forest restoration*

Module 6: *Developing a model farm management plan*

Field-Course Format: This course took place over five days at ELTI's Training Landscapes in the tropical dry forest, located in the Los Santos Province of the Azuero Peninsula. These sites demonstrate the varied biophysical and socio-economic contexts of different types of land use: (1) the Achotines Forest Reserve, a tropical dry forest ecosystem with both old growth and younger secondary forest patches; (2) IDB Forestal, native species tree plantations that incorporates cattle grazing in the understory; and (3) the APASPE model farms, which are privately-owned by members who have established silvopastoral and agroforestry systems, home gardens, and riparian area restoration. The following activities occurred throughout the week:



Participants learn about the experience of an APASPE member transforming his farm from conventional to more ecological practices.

Photo: Eli Wittum

Day 1: Course participants arrived at the Achotines Tuna Laboratory and were introduced to the laboratory's activities and given a tour of the installations. Saskia Santamaría (Neotropics Training Program Associate) facilitated an introductory presentation about ELTI and the objectives of the course. Jacob Slusser (Neotropics Training Program Panama Coordinator) delivered a lecture on the importance of ecosystem services and tropical dry forest ecology.

Day 2: Jacob led a walk through ELTI's interpretive trail system, within the Achotines Forest, where participants visited six different demonstration areas

covering the following topics: dry forest species identification, functional characteristics, successional guilds of key tree species, forest regeneration and successional phases, and buffer zones in riparian areas. In addition, participants worked in groups to conduct soils assessments on macro-fauna, soil structure, texture, infiltration, and pH, comparing differences between a ridgetop and lowland forest. Participants gained a better understanding of the species, interactions and processes that occur to maintain forest ecosystem services.

Participants also visited a younger secondary forest, which had been cattle pasture twenty years prior. They were able to observe the difference in species composition and structure from the mature forest and that natural regeneration can be an effective strategy to recover forest cover in a degraded pasture, if conditions are ideal.

After the walk, Jacob presented on the range of forest restoration strategies that can be utilized in agricultural landscapes. Following the lecture, Jacob led a field visit to IDB Forestal, an active restoration example where native tree species plantations were established and cattle graze in the understory once the trees are large enough to not be affected by the cattle. Participants were informed on the owner's objectives and how they influence the management of the property. They visited plantations with differing ages and species mixtures to discuss how to conduct tree species selection based on varied site characteristics. Additionally, natural regeneration and reforestation were compared in terms of their success to achieve different goals while considering cost efficiency.

In the evening, Jacob delivered an introductory lecture about sustainable ranching methods that integrate trees into pastures via silvopastoral systems (SPS). Jacob presented SPS not just as a model for production, but as a tool to facilitate ecological restoration by increasing biodiversity and utilizing conservation practices to recuperate ecosystem function, which aids ranching activities.



A group of participants discuss their rapid assessment of a farm and develop restoration strategies to present to the farm owner.

Photo: Eli Wittum

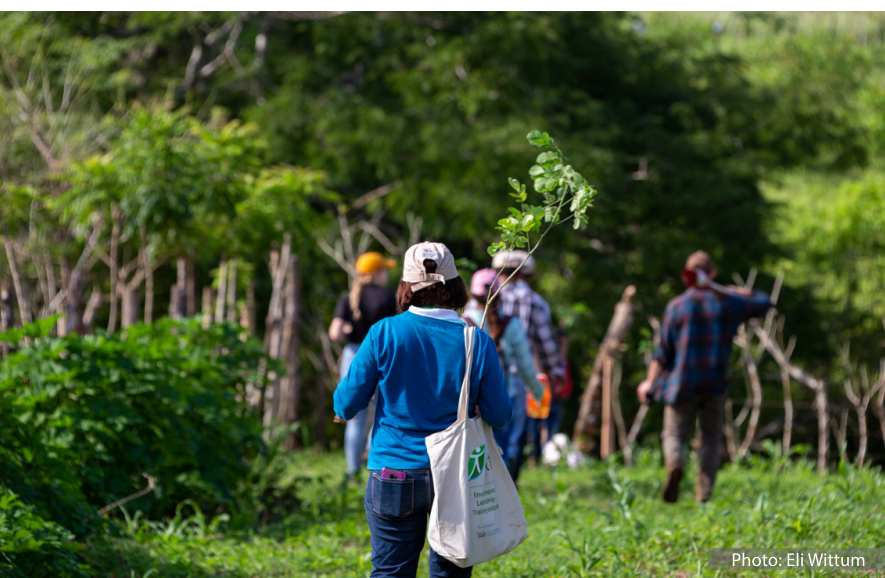
Day 3: Due to a scheduling conflict, Belgis Madrid, President of APASPE, was unable to present at the course. Therefore, Saskia Santamaría presented on APASPE's experience of creating and managing a community-based group. She discussed the process of how APASPE obtained their legal status, the planning and application for project funding, the implementation and management of their project, and strategies used for disseminating their successes and challenges to other interested parties.

Participants then 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: solar water pump and cattle aqueduct system, drip irrigation agroforestry system with shade coffee, Persian limes and short statured plantains, forage bank, intensive silvopastoral system, restoration of riparian areas via natural regeneration and native species reforestation conducted in a wildlife corridor. During the visit, Odielca 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 Odielca's message of perseverance and faith in sustainable practices.

After lunch, participants returned to Odielca's farm to focus on the establishment of a small-scale community tree nursery and techniques for propagating native tree species. Before commencing, 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. To start, Jacob quizzed participants on the objectives and factors for developing a nursery. Next, participants learned about the floristics of tree species, different seed types, harvesting techniques, storage and scarification processes and then practiced planting seeds. Participants then learned how to make substrate and practiced mixing and filling nursery bags and other containers. Finally, they transplanted seedlings from the seed germinator bed into prepared bags. To conclude the nursery session, Jacob reiterated common mistakes to avoid and other propagation best practices that are useful.

For the reforestation activity, Jacob led a field-based session to demonstrate different tree planting techniques and have participants practice by planting in a protected wildlife corridor that Odielca had established for the activity. Jacob discussed the importance of preparing the area in terms of securing it from disturbances, weeding and measuring and marking planting distances. He also



Participants carry tree saplings out to the protected corridor where they will be planted.

discussed ideal planting techniques, specifically calling attention to digging 40-centimeter deep holes to break compact soils and planting saplings with high amounts organic material or by using beneficial microorganisms from nearby forest soils. He also discussed post-planting maintenance including fertilizing, mulching with cardboard, and digging mini-swells and barrier walls for sediment and water retention. Participants then planted 20 saplings in the restoration corridor, utilizing the methods they had learned and being supervised by ELTI Staff.

Day 4: The final full day of training focused on putting the course concepts into practice. Participants visited the Los Yescos farm and received a guided tour by owner and APASPE member, Dolores Solís. During the visit they learned about the restoration strategies conducted including; a home garden, silvopastoral systems and agro-successional systems integrating timber, agricultural crops and cattle forage species. Some areas of the farm had suffered high levels of degradation due to conventional cattle ranching practices. Participants focused on these degraded areas of the farm and worked in groups to conduct a site diagnostic and develop their strategy to increase forest cover. Groups presented their plans and received feedback from Dolores as well as ELTI course facilitators.

For the final exercise of the course, participants worked in groups to develop farm management plans designed for their properties. Jacob provided an introductory lecture on the ten-step process, including: drawing a farm map, analyzing and rating their current farm via ten indicators, planning restorative activities to resolve farm problems, and then updating the farm map to illustrate planned interventions. Each group presented and received feedback by the facilitators. Although conducted as a course exercise, the farm plan is also a tool that participants will use to implement restoration efforts. In addition, with the help of ELTI collaborators, it is hoped that participants will utilize the plan to establish model farms that can serve to train others in the future.

Saskia presented ELTI's Leadership Program and the types of resources and support that ELTI provides to its alumni. She discussed various examples of how ELTI alumni have requested support and implemented course themes in the field. Participants filled out course evaluations and submitted them to ELTI Staff. To close the course, certificates were presented to the participants during a graduation ceremony and a group photo was taken. Afterwards, participants, APASPE members and ELTI Staff joined together for a final dinner to celebrate the completion of the course.

Day 5: Participants departed back to their communities.



A final group photo of the participants with their certificates.

Instructors and Coordinators: The course was facilitated by ELTI's Neotropical Training Program Staff: Jacob Slusser (Panama Coordinator) and Saskia Santamaría (Program Associate). Saskia introduced the course objectives to the participants, as well as ELTI's Leadership Program at the end of the course. Jacob delivered introductory lectures and field demonstrations on the concepts of ecosystem services, forest ecology, restoration strategies, native tree species propagation and nursery establishment and implementing agroforestry systems. Jorge Gutiérrez (ELTI Field Technician), Austin Broderick (Peace Corps Response Volunteer) along with APASPE members Odielca Solís and Dolores Solís facilitated model farm visits, explaining in detail the variety of restoration strategies and sustainable systems established. Eli Wittum (Peace Corps Response Volunteer) documented the event by recording video and photography.

Participants: The course was offered to extension agents from Panama's Ministry of the Environment, Peace Corps Volunteers and farmers from the La Villa River Watershed.

Course Follow-up: Course alumni will receive regular technical assistance and two follow-up workshops that will cover: (1) Post-training support to implement and monitor model farms; and (2) Leadership development to evaluate and disseminate knowledge. ELTI's goal is to empower alumni, as community environmental leaders, so that they make positive land-use decisions and educate and inspire others to do the same.

Cost: This course was offered at no cost for 13 selected participants thanks to the support of The Conservation, Food and Health Foundation (<https://cfhfoundation.grantsmanagement08.com/>) and the generous donation of the Arcadia Fund (<http://www.arcadiafund.org.uk>).