

COURSE REPORT

Ecological Restoration Strategies for Cattle Ranching Landscapes of the Azuero

District of Pedasi, Province of Los Santos
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A field course organized by:

The Environmental Leadership & Training Initiative (ELTI) and
the Association of Livestock and Agro-Silvopastoral Producers of Pedasi (APASPE)



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ESTRATEGIAS PARA
LA RESTAURACIÓN ECOLÓGICA
EN PAISAJES GANADEROS DE AZUERO

Background: Similar to other developing countries of the tropics, Panama's forests have been heavily degraded over the last century. In just the last 40 years of the 20th century, Panama lost more than 30% of its forest cover due to an expanding agricultural frontier. The most heavily deforested region of Panama, the Azuero Peninsula a dry-forest ecosystem, consists of monoculture agriculture and livestock landscapes. Due to current climatic changes and strong El Niño effects, the region is proving to be highly susceptible to droughts because of the lack of forest cover and overall ecosystem resiliency. One common land use, conventional cattle ranching, continues to degrade the land by promoting hostile, treeless landscapes via the removal of tree regrowth, planting of invasive-exotic pasture grasses, recurrent fires, overuse of agrochemicals and overgrazing. As a result, these pasture landscapes offer low farm productivity, environmental

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degradation and increased vulnerability to climate change, which threaten rural livelihoods and the ranching sector.

In recent years, however, interest in conserving and restoring tropical forests has increased and destruction of forests in Panama has slowed. One recent example was the creation of a twenty-year, national scale reforestation effort called “Alliance for One-Million Hectares,” a public-private partnership between Panama’s Ministry of the Environment (MiAmbiente), Panama’s Association for the Conservation of Nature (ANCON), the Panama Association for Reforestation (ANARAP), and the Panamanian Chamber of Commerce, Industry & Agriculture (CCIAP). The initiative aims to reforest one-million hectares over 20 years as well as strengthen Panama’s forest sector and meet the goals of Panama’s national forestry strategy.

Nevertheless, there continues to be a barrier between restoration science and practice, which results in poorly implemented restoration strategies based on little information. Therefore, to effectively promote the restoration of degraded lands, decision makers need to strengthen their capacity with the most recent restoration science and practices. One approach to strengthen capacity and transmit restoration knowledge is through intensive field-based courses situated in diverse biophysical and socio-economic landscapes. Field-based courses provide participants with the opportunity to actively engage in hands-on exercises that illustrate the importance of utilizing scientific investigation to develop adequate restoration strategies. ELTI has facilitated such courses in its Focal Training Sites in Panama since 2013.

Objectives: This event was a “training of trainers” course, for personnel from Panama’s Ministry of the Environment’s Sustainable Environmental Development Center (CEDESAM). CEDESAM staff were trained on both technical and leadership skills necessary to design and implement restora-



tion strategies in human-dominated landscapes with diverse landowners. These skills are increasingly important since these officials have the responsibility of training other stakeholders on methods to implement forest restoration as part of the recently announced national reforestation initiative, One-Million Hectares Alliance.

Field-Course Format: This course took place over five days at ELTI's Focal Training Sites in the dry tropical forest ecosystem that are located in the Province of Los Santos in 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 mature dry forest under conservation; (2) the Madroño property, an abandoned cattle pasture that has naturally regenerated into a young secondary dry forest under conservation; (3) IDB Forestal, a native species tree plantation that incorporates silvopastoral practices; and (4) the APASPE model farms, which are privately-owned properties that have established silvopastoral and agroforestry systems and riparian zone restoration. The content was divided in six core training modules, illustrated through classroom lectures and field-based demonstrations and exercises facilitated by ELTI staff, APASPE members and collaborators, as follows:

- **Module 1: Basic forest ecology and ecosystem services:** The first module presented a general introduction composed of three main themes: (1) ecosystem goods and services that originate from forests; (2) how tropical dry forests function; and (3) forest dynamics (succession and natural regeneration). The concepts introduced during the lectures were complemented in the field with a visit to ELTI's interpretative ecological trail located within Achotines Forest Reserve, which serves as a baseline forest. Throughout various demonstration sites, the participants observed different patterns, processes and characteristics of the mature coastal dry forest. Discussions focused on how abiotic and biotic factors influence the structure of the forest, its differences from wet forests and how it produces and regulates ecosystem services. Forest dynamics were demonstrated in a number of areas illustrating different rates of forest growth and change based on disturbance regimes, regeneration potential and successional phases.



- **Module 2: Land use and the degradation of ecosystem services:** The second module provided an introduction of the regional drivers of forest degradation. Examples in the field illustrated how conventional agricultural practices degrade forests and their ability to regenerate naturally, ability to provide ecosystem services, in addition to the negative socio-economic consequences upon local livelihoods and public health.



- **Module 3: Strategies for restoring ecosystem services in ranching landscapes:** The third module presented a conceptual framework, to develop appropriate restoration strategies based on biophysical and socio-economic variables, such as: (1) ecosystem resiliency; (2) land use history; (3) landscape matrix; (4) landowner goals and objectives; and (5) resource availability. Participants were also introduced to the principles and methods for forest restoration, via a range of passive to active restoration options for productive landscapes; (1) natural regeneration; (2) assisted natural regeneration (ANR); (3) reforestation; (4) agro-successional systems; (5) agroforestry; and (6) silvopastoral systems. Field trips to the Achotines Forest

Reserve and other properties that form ELTI's Focal Training Sites illustrated the different types of restoration strategies that can be implemented, their benefits and the different constraints to establishing them.

- **Module 4: Sustainable ranching:** This module focused on providing a more profound understanding of sustainable ranching practices, such as silvopastoral systems (SPS). Participants were introduced to three important components of SPS: (1) the context of unsustainable cattle ranching practices and its effects on production levels and ecosystem services; (2) the importance of biodiversity in agro-landscapes; and (3) the benefits of silvopastoral systems and the factors to consider in implementing, establishing and maintaining them. Participants visited a number of APASPE model farms, where each member/owner led the visit, explaining the range of alternatives to conventional ranching they have established on-farm, including; mixed forage bank, intensive SPS, riparian zone restoration and a timber plantation reforested with native species. In addition, participants learned about water management, which is key for cattle ranching systems, by visiting rainwater collection systems and cattle aqueducts. These visits served to illustrate the practical and beneficial application of the themes covered in the course on a locally-owned, private farm, which is an ideal environment to facilitate "farmer to farmer" learning.

- **Module 5: Community organizations: Advancing ecological restoration via local leaders:** APASPE Executive Board members presented on their experience of creating and managing a community-based group, specifically discussing the process of obtaining legal status, the planning and application for project funding, the implementation and management of their project and the strategies for disseminating their successes and challenges in the region. APASPE members explained their difficulties gaining support from government institutions and how they were interested in collaborating.



- **Module 6: Developing a restoration strategy via a conceptual framework:** The final day focused on the participants utilizing the knowledge they had learned during the course to develop a farm management plan with the objective to implement ecological restoration strategies on an actual farm. Participants were provided a tour of a local, conventional farm to serve as an example to conduct a farm diagnostic. Participants were split into groups and asked a series of questions that required they make observations about the property and develop strategies that were adequate for the farm and owner's constraints. The farm owner was present to answer questions from participants, explain her values and goals for the farm and provide feedback to the proposed strategies developed by participants.

The final exercise built on the diagnostics exercise, by utilizing a conceptual framework they had learned in the field and applying it on a landscape scale to a large property with degraded soils due to years of conventional agricultural practices. Participants were divided into groups that represented varying objectives of potential (fictional) buyers of the property. Each group was required to develop a restoration strategy based on the buyer's restoration objectives (timber, biodiversity, forest connectivity and agricultural production) and reforestation incentives and opportunities via the One-Million Hectares Alliance initiative. Groups developed their own restoration strategies that could be completed on the property while considering the resiliency of the ecosystem, land use history, surrounding landscape conditions, along with the owner's objectives and the economic cost of implementing the strategy. This exercise challenged participants to consider all the technical and social information, baseline studies and funding opportunities needed to develop an informed restoration strategy in each of their cases.



Instructors and Coordinators: The course was facilitated by ELTI's Neotropical Training Program Staff; Jacob Slusser (Panama Coordinator) and Saskia Santamaría (Program Assistant). Saskia introduced the course's objectives and format to the participants, as well as ELTI's Leadership Program at the conclusion of the course. Jacob led the classroom lectures, field visits and exercises. In addition, course collaborators: Jaime Madrid of IDB Forestal, and Belgis Madrid, Zoilo Vergara, Manuel Cedeño, Odielca Solís, Nicolás Solís and Dolores Solís of APASPE facilitated portions of the field trips to their model farms.

Participants: The course was provided at the request (and shared cost) of MiAmbiente's CEDESAM, to provide their staff training on restoration practices in cattle ranching landscapes. CEDESAM staff are a focal point for the ministry's efforts to implement the One-Million Hectares Alliance, as they operate the ministry's largest tree nursery and are extensionists who coordinate field activities throughout the country. The 7 course participants ranged from nursery workers, field extensionists, administrative officials and business professionals.

Course Follow-up: Participants were actively engaged in learning about restoration strategies for cattle ranching landscapes. In addition, individuals were very excited to transmit the practices seen on model farms into their efforts to implement the One-Million Hectares Alliance. Also, CEDESAM personnel were interested in developing further collaboration with APASPE in order to facilitate a tree-seed exchange program where they collect seeds from local trees for their seed bank and then provide the association with tree seedlings to plant during the wet season. Finally, this was the second course that ELTI has conducted at the request (and funding) of Panama's Ministry of the Environment. This highlights the recognition of ELTI as a leader in forest restoration training as well as the potential for ELTI to lower training costs by leveraging funding from collaborators.

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