

COURSE REPORT

Ecosystem Services and Tropical Forest Restoration

Agua Salud Project Site, Colon Province, Panama
August 12 - 17, 2013

A field course organized by:
Environmental Leadership & Training Initiative (ELTI)

Background: Tropical forests in Panama and around the world are rapidly disappearing, and with them a range of ecosystem services necessary to maintain life on the planet. In recent years, however, interest in conserving and restoring tropical forests has increased. In order to effectively promote these activities and to best inform the decisions regarding the development of strategies for restoration and land use planning, there needs to be a basic understanding of the ecological processes underlying the provision of ecosystem services. This knowledge is indispensable for managing the provision of environmental services in a sustainable manner in highly fragmented landscapes.

While in recent years valuable scientific studies about tropical forest restoration have been generated through multiple research projects, this information generally has not been effectively transmitted to the various stakeholders (or decisions makers) that manage forested landscapes. In fact, within Panama and Latin America, there is a great need for training opportunities to help guide informed decision making about the management, use and restoration of tropical forests.



Tropical forests tend to be comprised of a mosaic of different systems within highly complex landscapes due to the combination of various geological, soil and climate characteristics and anthropogenic land uses. Many tropical forest ecosystems are currently degraded to some level and often have a limited ability to regenerate. In such cases, ecosystem services can be recovered via the implementation of different active and passive restoration strategies, such as natural regeneration, reforestation and agroforestry systems, which permits the coexistence of trees with productive activities and sustainable use of forests.



One approach to capacity building and the transmission of 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 field-exercises that illustrate the importance of integrating scientific investigation into the development of adequate restoration strategies. ELTI is taking this approach by developing permanent training sites in both wet and dry tropical forest ecosystems in Panama that incorporate interpretative trails, demonstration areas and teaching curricula.

Objectives:

The overall goal of the course was to provide participants with the technical foundation needed to design and implement restoration strategies that increase the provision of ecosystem services in different land uses. The specific goals were to:

1. Provide participants with an understanding of the fundamental processes affecting the ecological functions of forests and the provision of ecosystem services in tropical regions through field-based observations and exercises;
2. Teach participants how to analyze the causes and consequences of environmental degradation on ecosystems and its influence on natural regeneration and active restoration of tropical forests at the local and regional scales;
3. Increase knowledge of the different strategies, tools and technologies available to inform and guide decision-making in forest management and landscape restoration;
4. Improve the awareness of the role that socio-economic factors play in restoration as well as how restoration strategies can be integrated into traditional livelihoods; and
5. Provide participants with the opportunity to meet and establish networks for the implementation of landscape restoration projects, with potential to be supported through ELTI's Leadership Program.





Field-Course Format: This course took place at ELTI's humid tropical forest site that is located in the Agua Salud Project field site (referred to as Agua Salud) of STRI. Agua Salud is an ideal setting for field-based forest restoration courses, as the project focuses on scientific studies to understand and quantify the ecological, social and economic services provided by tropical forests in the Panama Canal Watershed (PCW) under different types of land use and the effects of climate change.

Over the six days of the course, participants had a space for dialogue and learning and an opportunity to meet and exchange experiences, concepts and practical tools with ELTI and STRI instructors and national experts. Lectures that included discussions of readings and case studies, as well as group projects, were conducted on alternating days in order to take advantage of full days in the field. Field visits consisted of short lectures, observations and active exercises conducted in groups. The field-based components of the course were facilitated in the following four Agua Salud demonstration sites and interpretive trails that ELTI established: (1) forest measurement plots inside a native species tree plantation; (2) plots with successional guilds identified on trees in young, secondary forest regeneration in an abandoned agricultural landscape; (3) a forest measurement plot in an old secondary forest; and (4) a silvopastoral system that is managed under realistic management by a local rancher.

Furthermore, participants visited a series of other important sites inside the PCW, including: (1) a community-based tree nursery managed by The Association of Agro-ecological Producers of Gatuncillo River (APARGA); (2) the Quintero Farm, which is a subsistence agriculture and cattle ranching farm illustrating the influence of conventional agricultural practices on ecosystem services; and (3) the Pedro Miguel Locks on the Pacific Slope of the Panama Canal.

The course was divided into three core training modules, and each of the course themes were illustrated via field-based observations and exercises, as well as via data sets, case studies and published scientific articles from the humid forest region and Agua Salud research site:



Module 1: Forest ecology fundamentals and facilitation of ecosystem services in humid topical forests

This module included lectures that introduced: (1) humid tropical forests of Central America (geology, soils, hydrology, forest dynamics and ecosystem services); (2) humid tropical forest disturbances, regeneration and succession; and (3) the Agua Salud research site (objectives, current research, findings). Lectures were followed by field visits to the ELTI demonstration sites that were selected to illustrate different age classes of secondary forests. Participants observed and recorded the following within the demonstration sites: (1) characteristics of soils; (2) forest disturbance regimes; and (3) regeneration and succession. Field lectures and observations were followed by a forest measurements exercise in a pre-established forest plot within an old secondary forest, where teams collected data to later calculate timber volume, tree biomass, forest carbon and diversity.

Module 2: Limitations for the restoration and the provision of ecosystem services

This module covered the core concepts of addressing the degradation of humid tropical forests and specifically the ecological effects of degradation and the drivers of degradation in tropical forests. The primary points of this lecture were highlighted during a visit to a local landowner's farm to visualize the effects of conventional systems on marginal agricultural land. Participants recorded the farm's soils and vegetation characteristics, as well as abiotic factors that influence the integrity of the ecosystem services.

Module 3: Strategies for restoring ecosystem services in human-modified landscapes

This module presented the following four primary lectures: (1) the principles and methods of natural forest regeneration (assisted natural regeneration (ANR); (2) the principles of restoration via reforestation; (3) strategies for restoration in productive landscapes (how to finance restoration); and (4) an introduction to the Native Species Reforestation Project (known by the Spanish acronym PRORENA). Before heading into the field, participants were given a case study of an actual property where the landowner was interested in restoring agricultural productivity. Participants rapidly assessed the farm and presented their strategies.

The themes of the lectures were highlighted during additional field visits and exercises in the Agua Salud site, including: (1) a forest measurements and analysis exercise in the native species plantations; (2) the meteorological station; and (3) the weirs and well sensor sites that measure stream flow.





For the final exercise, participants visited a local farm with degraded soils due to years of conventional agricultural practices. Participants divided into groups and were asked to advise a potential buyer of the property. Each group was required to develop a restoration analysis based on the buyer's objectives (timber, biodiversity, connectivity or production) and provide the buyer with different strategies to meet their restoration goals. The exercise reinforced the importance of making decisions based upon well-researched, site-specific biophysical and socio-economic information before implementing a restoration strategy.

Instructors and Participants: This course was designed to convey advances in ecology and restoration of environmental services to national and international natural resource professionals and technicians. The twelve individuals selected to attend the course represented a number of organizations including: (1) the government; such as The Panamanian Ministry of Agriculture (MIDA), the Peruvian Agency for the Supervision of Forestry and Wildlife Resources (OSNIFOR), the Ecuadorian Ministry of the Environment, the National University of Costa Rica, the Alexander von Humboldt Institute for Research on Biological Resources of Colombia, the Colombian Federation of Cattle Ranchers (FEDEGAN) and STRI; (2) NGOs; including The National Conservation of Nature Association (ANCON), the Center for Research on Sustainable Agriculture Production Systems (CIPAV) and Fundación Natura; and (3) the private sector; including Panama Forest Services and SNC-Lavalin.

Outcomes and Follow-up: Participants were actively engaged in learning about the ecology and restoration of humid tropical forests throughout the course. Based on a request during the course, participants volunteered to provide short presentations highlighting their professional work related to restoration, which facilitated further dissemination of important restoration themes and knowledge amongst peers. This course also demonstrated the interest and need for a tropical forest restoration course aimed at professional practitioners focused in managed watersheds.

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