

COURSE REPORT

Seminar and Field Course on Ecological Restoration of Eroded Lands

Nirvana-Clavellinas Nature Reserve, Zapatoca, Santander, Colombia April 4-7, 2019

An open seminar and field course organized by:

The Environmental Leadership and Training Initiative (ELTI), Center for Research on Sustainable Agricultural Production Systems (CIPAV), Nirvana-Clavellinas Nature Reserve



Background

Roughly 2.9% of continental Colombia is affected by severe and very severe erosion (30,632 km² and 2,714 km², respectively). This includes landslides and gullies, both of which are common in the densely populated Andes. In these unstable areas, mass movements pose a serious threat to local

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populations and cause off-site environmental damage through sedimentation, pollution, and increased flooding. Not surprisingly, Colombia is one of the countries with the highest annual rate of human losses in landslides and the largest population living in high-risk areas.

This training event aimed to increase awareness of the complex socio-ecological issues related to erosion and to expand the knowledge of participants on the methods available for restoring eroded lands. The seminar and field course were based on CIPAV's experience in stabilizing unstable slopes and eroded areas through a combination of soil bioengineering techniques and high-density planting. This novel approach allows a fast and complete recovery of stability and vegetation in gullies and slopes.

The principles and methods that guide ecological restoration of eroded lands were introduced in an open seminar offered at the municipality of San Vicente de Chucurí, an area where road infrastructure and

agricultural productivity are deeply affected by slope instability. All practical activities took place at the Nirvana-Clavellinas Nature Reserve at Zapatoca.

Objectives

- Strengthen local capacities for the ecological restoration of eroded and unstable lands.
- Introduce the theoretical and practical aspects of ecological restoration, bioengineering and revegetation with native plants.
- Advance the implementation of a pilot model for erosion control at the Nirvana Clavellinas Nature Reserve (Zapatoca, Santander).



Open seminar at the main theater of San Vicente de Chucurí (Santander, Colombia).

Seminar and field course format

<u>Day 1</u>

The training event began with an open seminar that took place at the main theater of the municipality of San Vicente de Chucurí (Santander, Colombia). The call for this event was made through radio, social networks, printed posters displayed in strategic places and direct invitation to local institutions and public schools. A total of 89 people attended the seminar, including farmers, local authorities, high school students, teachers, technical assistants and professionals.

The seminar opened with a presentation in which ELTI Colombia Program coordinator, Zoraida Calle, explained the natural and human-induced causes of soil erosion, the hydrological functions of plants, the types of landslides and the principles that guide the ecological restoration of unstable slopes and eroded lands.

After the morning break, CIPAV researcher and ELTI alumnus Mauricio Carvajal talked about "Stabilizing eroded lands through social participation, soil bioengineering and the strategic use of native plants".

After lunch, Zoraida and Mauricio presented a series of case studies of slope stabilization and landslide restoration in Colombia and Mexico. Following that, three short presentations focused on local experiences:

- Participatory research at Colnupaz school, by high school students Jonathan Hernández and Karen Portilla.
- Participatory conservation of endangered plants in San Vicente de Chucurí, by ELTI alumna Melisa Ayala.
- Agroecological restoration at the Nirvana-Clavellinas. Nature Reserve, by ELTI alumnus and reserve owner Juan Fernando Martínez.

The event closed with a discussion on the challenges of restoring eroded lands in the tropical Andes.

Days 2 - 4:

Day 2 began early with the trip in four-wheel drive vehicles to the Nirvana-Clavellinas Nature Reserve in Zapatoca (ELTI focal training landscape). After a traditional breakfast prepared with locally grown food, the field course participants received a series of safety recommendations and instructions for all field activities.



Recovery of vegetation inside the gully as a result of restoration treatments applied by the participants of the 2018 field course.

Then, the whole group walked to the upper part of the gullies, where they analyzed the factors that caused the erosion of the historic trail, the water flows and the vegetation inside and around the gully. This provided an excellent opportunity to discuss concepts such as reference ecosystem, restoration goals and land rehabilitation in the context of forest landscapes with severe erosion.

After understanding the events and processes that led to the formation of the gullies, the group slowly walked downward, analyzing the effects of the different restoration treatments applied one year before by the participants of the 2018 field course: assisted natural regeneration around the gully, direct seeding of nitrogen-fixing plants, planting of seedlings and saplings, filling of cavities with cut bracken, planting vegetation strips across the slope and assembling biomechanical structures for erosion control. By comparing the baseline photos with the current condition of the gullies and surrounding areas, participants and instructors used this outdoor classroom as a restoration laboratory and understood the effects of different restoration treatments.

The remaining two days of the field course consisted entirely of practical exercises and guided walks in three sectors of Nirvana-Clavellinas reserve: the large gullies on the historical trail, the biodynamic orchards and cultures, and a trail that crosses different types of vegetation. Participants were divided into four subgroups that rotated between four half-day activities.

Trainers Mauricio Carvajal and Melisa Ayala coordinated restoration exercises at the gullies; Juan Fernando Martínez guided participants through the reserve's agroecological farming systems, and Zoraida Calle explained the functional traits that confer restoration value to different native plants and showed the participants how to collect seeds and seedlings.

All groups had the opportunity to practice the main steps of restoration projects that take place in highly degraded landscapes: analyzing erosion, water flows and surrounding vegetation; collecting seeds and seedlings of native plants; accelerating plant recovery through assisted natural regeneration; assembling biomechanical structures with wood and planting vegetation strips across the slope. Group discussions before and after the field exercises enriched the diagnosis and design of the restoration project at the Nirvana-Clavellinas reserve.



Field course participants practiced different soil bioengineering techniques and high-density planting.



Course participants discussed their learning experience at Nirvana-Clavellinas Nature Reserve.

Participants

This field course brought together a heterogeneous group composed of farmers, technical assistants, teachers, social workers, community leaders and young professionals trained in biology, agronomy and environmental studies. College graduates were faster in understanding the theoretical aspects of restoration, plant ecology, soil science and hydrology involved in recovering gullies. But local farmers were the indisputable leaders in practical aspects such as using tools, digging holes, cutting timber, preparing organic fertilizer and seed mixtures, sowing seeds, cutting bracken and planting trees. Soon, participants with different backgrounds and experience were able to solve specific restoration challenges through a dialogue between academic and traditional agricultural knowledge. Most importantly, college graduates and local farmers were able to understand each other's perspectives on land degradation and ecological restoration.

The event was promoted through social media, ELTI's webpage, alumni networks, radio and printed posters. The 29 participants were chosen from a much larger group of candidates. Course instructors took care to select a group representing different regions of Colombia, types of skills and age groups.

Instructors

- Zoraida Calle, ELTI and CIPAV
- Mauricio Carvajal, CIPAV and ELTI alumnus
- Melisa Ayala, MSc student and ELTI alumna
- Juan Fernando Martínez, Nirvana-Clavellinas Nature Reserve

Outcomes and Follow-up: Reversing the negative environmental and socio-economic effects of severe erosion demands a creative dialogue between several disciplines. Latin American countries spend enormous amounts of money implementing structures such as retaining walls in areas that could be enhanced more sustainably through ecological restoration and soil bioengineering techniques. This course illustrated a novel approach for restoring severely eroded slopes, based on simple timber stabilization structures combined with high-density planting of species that exhibit quick growth and sprouting.

Through the strenuous work involved in the process of re-covering gullies, field course participants discovered that restoration not only heals degraded lands but also connects people. Farmers and professionals described a feeling of satisfaction, a sense of purpose and a joyful connection with others. They discovered that more than a set of practices and methods grounded in science, restoration is a meaningful activity that mobilizes people to achieve positive environmental change. No similar courses are yet available in Latin America. With this event, ELTI pioneers training in an unexplored field in the region: restoration for risk reduction and disaster prevention.



Andrea's harvest of Crotalaria seeds will help restore soil fertility.

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.