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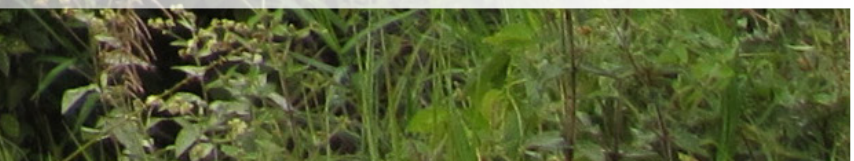
Environmental Leadership & Training Initiative

Strategies and innovations for capacity building on ecological restoration

April 13, 2015
Buenos Aires, Argentina

Proceedings of a Symposium held during the IV Iberoamerican and Caribbean Congress on Ecological Restoration

CIPAV
COLOMBIA



Symposium Proceedings

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the IV Iberoamerican and Caribbean Congress
on Ecological Restoration

April 13, 2015
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Organized by:

The Environmental Leadership and Training Initiative (ELTI)
and
The Center for Research on Sustainable Agricultural
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We also thank the symposium attendees and presenters who enriched the event with their diverse perspectives regarding the strategies and innovations necessary for capacity building on ecological restoration. Presenters included:

- Zoraida Calle – Center for Research on Sustainable Agricultural Production Systems (CIPAV);
- Saskia Santamaría and Gillian Bloomfield – Environmental Leadership Training Initiative (ELTI);
- Pedro Brancalion – University of São Paulo;
- Gabriela González García – EcoLogic Development Fund;
- Carlos Estrada – Association of Water Committees of the Southern Sector of the Pico Bonito National Park (AJAASSPIB – acronym in Spanish);
- Severino Rodrigo Ribeiro Pinto – Center for Environmental Research of the Northeast (CEPAN – acronym in Portuguese); and
- Marina Campos – The Nature Conservancy (TNC) Brazil.

TNC would like to thank their forest restoration fieldwork team as well as their partners and all involved parties, which have collaborated in their projects seeking the integration of the conservation of nature and social development.

Finally, we would like to thank Liliana Dávlia Stern for the creation, editing and translation of this publication, as well as all of the other people who contributed to the success of the symposium.

List of Acronyms

APASPE	Association of Agro-Silvopastoral Producers of Pedasí
AJAASSPIB	Association of Water Committees of the Southern Sector of the Pico Bonito National Park
MOOC	Massive Open Online Course
CEPAN	Center for Environmental Research of the Northeast
CIPAV	Center for Research on Sustainable Agricultural Production Systems
EcoLogic	EcoLogic Development Fund
ELTI	Environmental Leadership and Training Initiative
FEDEGAN	Federation of Cattle Ranchers of Colombia
GEF-SGP	Global Environment Facility's Small Grants Program
GhG	Greenhouse Gases
Ha	Hectare
IAvH	Alexander von Humboldt Biological Resources Research Institute
LERF	Forest Ecology and Restoration Laboratory
PES	Payment for Ecosystem Services
REDD	Reducing Emissions from Deforestation and Forest Degradation
SIACRE	Iberoamerican and Caribbean Society for Ecological Restoration
SPS	Silvopastoral System
iSPS	Intensive Silvopastoral System
STRI	Smithsonian Tropical Research Institute
TNC	The Nature Conservancy
TRIC	Tropical Native Species Reforestation Information Clearinghouse

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Executive Summary

Around the world, deforestation and the unsustainable use of agricultural lands are leading to the reduction of ecosystem quality, productivity and resilience. This combination of environmental problems, exacerbated by climate change, has sparked a great interest in the restoration of forests, biodiversity and environmental services to degraded landscapes. A growing number of organizations, private enterprises and public institutions are recognizing that ecological restoration is a priority for global action, and these entities are becoming increasingly involved in efforts to conduct restoration activities at all scales: local, regional, national and international.[1]

Meanwhile, researchers, NGOs and land managers themselves are making great advancements in the science and practice of ecological restoration. Training and capacity building are important tools for these groups to share the principles and lessons learned from their experiences in the field, thereby helping the global community reach ambitious restoration targets. In each restoration effort there are diverse stakeholders involved, many looking to enhance their knowledge, abilities and technical capacity to carry out about the design, implementation and management of restoration projects. Capacity building is needed to help these stakeholders successfully carry out aspects of monitoring, seed collection, establishment of nurseries and other key components for restoration projects.[2] Additionally, there is a great need for activities that strengthen the institutional capacity of different stakeholders in order to help them navigate legal processes and conduct appropriate project management so that they can conduct restoration within their local sociopolitical and cultural contexts.[3]

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1 Aronson, J. and Alexander, S. (2013); "Ecosystem Restoration is Now a Global Priority: Time to Roll up our Sleeves," Restoration Ecology, Vol. 21, pp. 293–296.

2 Melo, F.P.L., Pinto, S.R.R., Brancalion, P.H.S., Castro, P.S., Rodrigues, R.R., Aronson, J., and Tabarelli, M. (2013); "Priority setting for scaling-up tropical forest restoration projects: early lessons from the Atlantic Forest Restoration Pact," Environmental Science & Policy, Vol. 33, pp. 395–404.

3 Slusser, J.L., Calle, A. and Garen, E. (2014); "Increasing local capacities in rural Panama" in Chavez-Tafur, J. and Roderick J.Z. (eds.); Towards Productive Landscapes,Tropenbos International, Wageningen, the Netherlands. xx + 224 pp. http://www.etfrn.org/file.php/314/etfrn-56web.pdf

Even though many groups recognize the importance of training and capacity building for restoration, there are few academic publications or other resources that provide insight into the strategies for designing and implementing capacity building activities specifically for restoration. It is for this reason that the Environmental Leadership and Training Initiative (ELTI) at Yale University and the Center for Research on Sustainable Agricultural Production Systems (CIPAV - acronym in Spanish) organized a symposium to take place during the IV Iberoamerican and Caribbean Congress of Ecological Restoration in Buenos Aires, Argentina from April 12 through April 16, 2015.

This symposium titled "Strategies and innovations necessary for capacity building on ecological restoration" drew together experts from various countries to share their experiences related to the themes of training and capacity building for ecological restoration in Latin America.

In the first presentation, Zoraida Calle from CIPAV presented on lessons learned from over twenty years of capacity building activities. CIPAV works to promote the rehabilitation of pasture landscapes through the establishment of silvopastoral systems and restoration of areas affected by severe erosion and landslides. Specifically, Zoraida discussed multiple training strategies such as field activities, conferences, university courses, participatory research studies, workshops and facilitated farmer-to-farmer visits, all of which have been made possible through a network of partner cattle ranchers and demonstration farms.

Next, two ELTI staff members, Saskia Santamaría and Gillian Bloomfield, presented on ELTI's work since 2006 to provide capacity building opportunities and serve as a bridge between scientists and decision makers. First, Saskia described ELTI's two overarching programs: 1) the Training Program which is dedicated to carrying

out training activities to provide theoretical and practical knowledge; and 2) the Leadership Program which helps program participants apply this knowledge through the implementation of restoration and other projects. Secondly, Gillian highlighted ELTI's Online Training Program, launched in 2013, that has been able to take advantage of web-based tools in order to reach a global audience. The online program allows people from different countries, with very different schedules, to participate in an exchange of restoration perspectives and experiences.

Dr. Pedro Brancalion of the University of São Paulo, then, discussed the strategies used by the Brazilian Atlantic Forest Restoration Pact (AFRP) to develop a training program based on lessons learned from more than 30 years of scientific research throughout the country. The results of this research and experience are being used as the theoretical basis for training over 300 organizations that comprise the AFRP's collective movement to achieve the restoration of 15 million hectares of Atlantic Forest.

In the following presentation, Gabriela González of the EcoLogic Development Fund described how EcoLogic has worked since 1993 on capacity building within indigenous and rural communities in order to empower them to restore and protect critical ecosystems of Central America and Mexico. As an example of the close institutional ties between EcoLogic and its partners, community leader, Carlos Estrada, presented the experience of the Association of Water Committees of the Southern Sector of Pico Bonito National Park (AJAASSPIB - acronym in Spanish) in Honduras.

Afterwards, Dr. Severino Ribeiro Pinto of the Brazilian Center for Environmental Research of the Northeast (CEPAN - acronym in Portuguese) presented strategies used for research and training to 1) support the creation of protected areas; 2) improve forest

restoration and ecosystem services; and 3) protect species in danger of extinction.

Finally, Marina Merlo Campos of The Nature Conservancy - Brazil described the activities that TNC performs as part of their National Training Program for Ecological Restoration. TNC Brazil provides training courses and develops print and digital educational materials, such as manuals, pamphlets and guides for field technicians. These materials and courses are created for specific geographic regions in order to take into account the ecology and the policies for a targeted area.

The initiatives presented in the symposium exemplified not only the importance of training, but also specific strategies and lessons learned by the speakers' organizations conducting capacity building for ecological restoration in Latin America. The summaries provided in this document highlight the key points discussed by the presenters in order to communicate relevant information to professionals, policy makers and others for the development of future training and capacity building activities on this issue of global importance.


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ASISTENTE
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PRESENTATION #1

Capacity building for ecological restoration in agricultural landscapes

Zoraida Calle

CIPAV

Zoraida Calle of the Center for Research on Sustainable Agricultural Production Systems (CIPAV)(*Centro para la Investigación en Sistemas Sostenibles de Producción Agropecuaria* in Spanish)[4] presented experiences and lessons learned from twenty years working in various processes of capacity building in two of CIPAV's priority work areas.

CIPAV is an autonomous, non-governmental research center that works on research, capacity building and promotion of sustainable agricultural production systems in three main thematic areas: sustainable cattle ranching, ecological restoration and ecosystem services. Zoraida emphasized that for CIPAV, capacity building is important because it helps to bring about a cultural change to advance sustainable and integrated land management. She also explained that work on ecological restoration, on its own, is not enough; rather, it is necessary to work collaboratively to promote restoration, conservation and sustainable use of natural resources.

The examples in this presentation focused on two main themes: the restoration of areas affected by severe erosion and the conversion of conventional cattle ranching into more sustainable cattle ranching approaches.

In terms of severe erosion, Zoraida explained, this work is a priority for Colombia and the entire Andean region. Across the globe, Colombia has the second greatest risk of human casualty from landslides after Indonesia – a category measured by the size of the population exposed to possible landslides and annual casualties from landslide events[5]. Similarly, Colombia tops the list of countries with the most subregions at risk, followed by Tajikistan, India and Nepal, due to the high number of deaths registered per year per 100 square kilometers. The degradation of Andean soils results in an increase in frequency of landslides and the formation of upstream erosion gullies and cave-ins.

4 http://www.cipav.org.co/

5 Nadim, F., Kjekstad, O., Peduzzi, P., Herold, C., and Jaedicke, C. (2006). "Global landslide and avalanche hotspots," Landslides, Vol 3, pp.159-173.


CIPAV

For CIPAV, restoration serves as an important strategy to stabilize the land and prevent landslides. Two key elements of this restoration work are the use of biomechanical structures and high-density planting to stabilize soils in degraded areas. Additionally, CIPAV advocates for the active participation of local stakeholders during the entire process of restoration, including diagnosis, planning, selection of species, growing of seedlings and saplings, project implementation, planting and monitoring.

The second main theme of CIPAV's work is the conversion of conventional cattle ranching towards more sustainable, yet productive, land-uses. Cattle ranching provides high quality food for a growing global population, however, to be done sustainably it requires a reduction in environmental impact. This means preventing water contamination, lowering emissions of Greenhouse Gases (GHGs) into the atmosphere, avoiding deforestation, preventing soil degradation, providing ecosystem services within cattle ranching systems and improving animal well-being.

According to CIPAV, ecological restoration activities in cattle ranching systems should focus on:

- Conserving what remains of natural ecosystems
- Increasing the productivity and cost effectiveness of the system
- Improving the generation of environmental goods and services
- Facilitating the recovery of fragile, marginal and other strategic lands for ecological restoration

To achieve these goals, Zoraida recommended the adoption of silvopastoral systems (SPS), which are agroforestry arrangements that combine forage plants, such as grasses and legumes, with trees and

6 Harvey, C.A., Tucker, N., and Estrada, A., (2004). "Live fences, isolated trees and windbreaks: tools for conserving biodiversity in fragmented tropical landscapes?" in: Schroth, G., Fonseca, G.A.B., Harvey, C.A., Gascon, C., Vasconcelos, H.L., and Izac, A.M.N. (Eds.), Agroforestry and Biodiversity Conservation in Tropical Landscapes, Island Press, Washington, DC, pp. 261–289.

shrubs for feeding livestock and complementary uses.[6] The trees in the system can be dispersed throughout the pastures, serving as living fences, wind breaks and sources of forage.[7] When conversion to a highly productive system is required, ranchers can employ intensive silvopastoral systems (iSPS), which combine a high density of trees and forage shrubs with high productivity grasses. One hectare of an intensive silvopastoral system can include up to 500 trees and over 10,000 forage shrubs for cattle grazing.[8]

Zoraida mentioned various differences between conventional extensive cattle ranching and intensive silvopastoral systems, with the iSPS requiring:

- More rigorous management
- Administrative controls
- Constant adjustments based upon periodic follow up
- Simple, but obligatory, management protocols
- Correct management of electric fences to ensure an intensive and continuous grazing in narrow strips
- Short rotations to reduce the impact of cattle on the soil
- Encouraging the recovery of cattle fodder

Meanwhile, the most significant difference between the systems is the amount of land required to produce one ton of beef per year. Using the Dry Caribbean Climates of Colombia as an example, Zoraida showed that an iSPS needs 1.1 hectares to produce one ton of beef in a year, while conventional extensive cattle ranching requires 14.8 hectares – almost 14 times more land.

Currently, CIPAV is involved in the implementation of the Mainstreaming Sustainable Cattle Ranching Project in Colombia with funds from the World Bank and the Global Environment Facility to

7 Pezo, D. and Ibrahim, M. (1998). "Sistemas silvopastoriles. Módulo de Enseñanza Agroforestal" No. 2. CATIE - Serie de Materiales de Enseñanza No. 40. 258 pp.

8 Calle, Z., Murgueitio, E., and Chará, J. (2013). "Integrating forestry, sustainable cattle-ranching and landscape restoration," Unasylva 239, Vol. 63, 2012/1: 31-40.

increase the use of silvopastoral systems in Colombia and to promote biodiversity conservation by enhancing forest connectivity across the landscape. Zoraida described that "the process of scaling-up sustainable ranching, which offers more benefits to more people more rapidly and in a more sustained way, involves inspiring cultural and intellectual change" among agriculturalists, scientists, educators and policy makers. The idea is to enable and encourage these stakeholders to implement sustainable techniques, thus spearheading the advancement of scientific innovation and new techniques for the creation of economic and market incentives at all levels and scales.

In the next section, Zoraida described the specific capacity-building strategies used by CIPAV in order to achieve the proliferation of silvopastoral systems.

Courses and field visits:

First, Zoraida mentioned that CIPAV's capacity building, training and resource sharing activities are directed towards different actors: students (from high school through doctoral programs), producers, farm workers, administrators, researchers, field technicians, policy makers, extension staff and other decision makers. The training activities include field courses and field visits, conferences and university courses, as well as participatory research and workshops.

With respect to field days and field courses, she pointed out the value of facilitating peer-to-peer learning for knowledge exchange, using producer-to-producer exchanges as an example. To show the benefits of the field courses she cited the following Vietnamese proverb: "To see is one hundred times better than to hear and to touch is one thousand times better than to see," stating that the field courses are a very effective teaching strategy because they allow people to see and touch what they are learning about.

Along with this point, she highlighted the established collaboration between ELTI and CIPAV in the development and delivery of the following field courses within the framework of the Mainstreaming Sustainable Cattle Ranching in Colombia Project:[9]

- Connectivity Corridors Restoration in Cattle Ranching Landscapes (May 21-26, 2011)
- Strategies for the Sustainability of Connectivity Corridors held in Armenia, Quindío (October 8-13, 2011)
- Fundamentals of Ecological Restoration of Tropical Forests held in the Cali River Watershed, Valley of Cauca (December 1-7, 2013)
- Ecological Restoration in Cattle Ranching Landscapes held in the Caribbean Eco-region with FEDEGAN and ELTI (July 20-25, 2014)

9 Aside from those mentioned, CIPAV, ELTI, SOCLA (the Latin American Scientific Society of Agroecology) and "El Hatico" Natural Reserve worked collaboratively to deliver the course "Agroecolgy and Ecological Restoration: Sustainable Agricultural Landscapes with Resilience" (From July 21-25th, 2015).

Pilot farms:

Zoraida highlighted the role of pilot or demonstration farms as a fundamental tool for capacity building, especially since the pilot farm managers that are successful in the adoption of silvopastoral techniques can be great teachers and trainers. Also, participatory research in these farms has been crucial for optimizing silvopastoral models for different agroecosystems in working cattle ranches.

Written documents

Next, Zoraida mentioned the importance of participation in different written media sources. For example, CIPAV has a permanent section in the Federation of Cattle Ranchers of Colombia (FEDEGAN) Newsletter, a publication directed to an audience of more than 10,000 ranchers subscribed in Colombia. Additionally, she emphasized that scientific publications can be effective in reaching academic audiences.

Other strategies

Zoraida then described some less conventional tools used for training, such as music, which has played an important role in outreach for some techniques and sharing the benefits of restoration and sustainable ranching. For this, CIPAV has worked with key allies such as Adolfo Cardozo – researcher, educator, composer and interpreter – and León Octavio Osorno – director and composer of the musical group *Campo y Sabor*, both with ample experience in translating complex technical messages into popular music and folk songs. She also mentioned that the use of audio-visual media such as interactive videos, photographs and publications were well-received. In one informational publication used for training and environmental awareness building among teens and children, CIPAV featured the characters *Renovencio Montes Alegría* as the protagonist and restoration worker along with *Erosionildo Candela* as the degrader of ecosystems.

There are many stakeholders to be trained and each of them has their own motivations for participating in the training and will benefit from specific tools as detailed in the following table:

Table 1. Stakeholders for directing capacity building efforts

STAKEHOLDERS	MOTIVATIONS	TOOLS FOR CAPACITY BUILDING AND MOTIVATING CHANGE
Field workers	Acquire knowledge and skills allowing them to have better working opportunities and employment security	Workshops; field days; transfer of knowledge from technicians to workers or between workers; field demonstration sites
Rural communities	Conserving their land and ways of life; developing a community base	Workshops, field days, technical tours, exchanges of experiences, pamphlets, posters, music, audiovisual material.
Rural producers of different scales	Small scale: guarantee food and water security (access to and quality of water) Large scale: guarantee the financial sustainability of their business along with social and environmental sustainability	Workshops; field days; technical tours; exchanges of experiences; pamphlets; posters; music; audiovisual materials
Agricultural business owners/entrepreneurs	Guarantee the financial sustainability of their business along with social and environmental sustainability	Personalized field visits with business owners and their advisers to learn from business experiences; financial information; informational articles
Students (university and technical)	Participation in different markets; understand how to apply their knowledge; contribute to solutions to the problems of society	Theoretical and practical courses; field courses; conferences; audiovisual material
Technicians and professionals	Bolster their basic training with applied experiences	Informational articles; workshops; seminars; field visits
Researchers	Generate information to address problems of environmental degradation and climate change	Scientific articles; informational documents; academic conferences
Political decision makers and public officials	Compliance with treaties, climate change conventions, biodiversity, land degradation	Scientific articles; legal frameworks.
International exchanges	Help to comply with environmental and social goals (Millennium Development Goals)	Scientific and informative articles; synthesis publications; sharing lessons learned; technical, social and economic evaluations of projects; legal frameworks

Due to the international significance and implications of post-conflict Colombia for the conservation of biodiversity, Zoraida mentioned that the end of the negotiations (with the guerrilla groups) could signify an important opportunity for ecological restoration in the country. With adequate capacity building processes the ex-guerrilla members could be key actors in restoration projects in Colombia.

In conclusion, Zoraida reaffirmed that capacity building for integrated land management, including conservation, ecological restoration and sustainable production, "demands the crossing of boundaries between different disciplines and levels of training, between training programs and knowledge generation and between ideologies, cultures and world views."

PRESENTATION # 2

Capacity building on ecological restoration in human-modified landscapes

Saskia Santamaría

Environmental Leadership and Training Initiative, ELTI

Saskia Santamaría, of the Environmental Leadership and Training Initiative (ELTI), presented about ELTI's experience conducting capacity building activities on the subject of ecological restoration in human-modified landscapes of the Neotropics. ELTI is a program of Yale University's School of Forestry and Environmental Studies and works in collaboration with the Smithsonian Tropical Research Institute (STRI), the National University of Singapore and other local partners in different countries.

Saskia explained that ELTI was created in 2006 with the goal of helping land-use decision makers throughout the tropics to conserve and restore tropical forests, native tree cover and the ecological integrity of human-modified landscapes. Therefore, the target-audience of ELTI's activities are those people with the ability to influence those landscapes, such as: public officials, farmers, producers, community leaders, practitioners and other stakeholders that directly or indirectly influence land-use in agricultural or degraded areas.[10]

ELTI has developed two programs: the Training Program and the Leadership Program. The Training Program is dedicated to strengthening theoretical and practical knowledge through field courses and online courses, workshops, field activities, conferences, symposia and open access online and print materials. The Leadership Program, which distinguishes ELTI from other similar initiatives, is dedicated to providing follow-up support to ELTI program alumni to help them implement and share what they learned in an ELTI training course. Most of these activities are subsidized and offered with scholarships funded by donors such as Arcadia.[11]

To date, ELTI has concentrated its efforts in the Neotropics and in tropical Asia in regions with a high level of biodiversity and

10 Distinguishing ELTI from other training initiatives, ELTI is not focused students or protected areas as its target audience.

11 http://www.arcadiafund.org.uk

areas where ELTI and Yale University have developed important partnerships to work collaboratively with local organizations for training and capacity building efforts.

During the early years of ELTI, Saskia explained that the initiative explored different regional locations and themes such as:

- Governance of conservation and restoration strategies
- Threats to tropical forests, including the production of biofuels and the development of infrastructure (ie., highways)
- Land-use planning and decision making in sustainable land management
- Restoration and sustainable ranching

In Latin America, ELTI designed and delivered courses, workshops and conferences in Brazil, Colombia, Honduras, Panama and Peru. Over time and with support from local partners, ELTI selected field sites in three neotropical countries and defined specific themes on which to focus. Today, ELTI's work in the Neotropics takes place in Panama, Colombia and Brazil and ELTI's work in Asia takes place in the Philippines and Indonesia. Their respective regional bases, are in Panama at the Smithsonian Tropical Research Institute and in Singapore at the National University of Singapore. ELTI narrowed its focus to the following themes for which it had a unique niche:

- Native species reforestation and other restoration strategies in tropical forests landscapes, including nurseries establishment and seedling propagation
- Integration of trees and forests in degraded landscapes
- Rehabilitation of severely degraded landscapes (i.e., mining sites)
- Monitoring restoration initiatives
- Mangrove restoration
- Financing schemes for conservation and restoration projects, such as Payments for Ecosystem Services (PES) and Reducing Emissions from Deforestation and Forest Degradation (REDD)
- Watershed restoration

ELTI works in close partnership with local strategic partners in the countries where it operates. ELTI collaborates in Panama, with STRI and the Association of Agro-Silvopastoral Producers of Pedasí (APASPE); in Brazil, with the Center for Environmental Research of the Northeast (CEPAN) and the Forest Ecology and Restoration Laboratory (LERF) at the University of São Paulo; in Colombia, with the Center for Research on Sustainable Agricultural Production Systems (CIPAV) and the Alexander von Humboldt Biological Resources Research Institute (IAvH).

Overall, Saskia explained that ELTI's strategy is to conduct field courses, offer online courses (recently developed[12]), create networks and otherwise strengthen the capacity of decision makers to advance the protection, restoration, and management of degraded landscapes in tropical forests.

Saskia next described the process by which ELTI works with local partners to develop a field training course. Together, ELTI and the local partners choose a theme for the trainings and decide upon the audience and the specific location based on the particular training needs identified. Then, the curriculum is created or adapted, including through the use of case studies and field visits. ELTI staff or international presenters provide important theoretical and practical insights. Additionally, Saskia emphasized that one of the advantages of working collaboratively with local research institutions such as the Smithsonian, CEPAN, LERF, CIPAV and IAvH, is the ability to incorporate into the trainings the most recent and up to date scientific studies and applied experience from a particular region. In addition, she added ELTI often collaborates with alumni of previous ELTI programs. For example, in Panama, ELTI alumni and members of APASPE, the aforementioned association of producers in Panama, frequently serve as co-facilitators in many ELTI courses.

Saskia explained that most of ELTI's field courses last for three to seven days and include 15-30 participants. The online courses last for four to six weeks and have a similar number of participants. Additionally, ELTI has permanent training sites in two different ecosystems of Panama, one in wet evergreen forest as part of the "Agua Salud" Project located in the Panama Canal Watershed, and the other in dry forest, located in Panama's Azuero Peninsula, a highly degraded and deforested area of the country. These training sites incorporate the use of trails and demonstration areas. Academic materials have been developed for both ecosystems, such as guides,

12 See Presentation 3 for more details.

talks and exercises, using data from studies conducted by scientists at STRI and Yale University. ELTI is in the process of developing additional permanent training sites in Colombia and Brazil, as well as in Indonesia and the Philippines.

Below are some examples of the trainings developed by ELTI, classified by focal topic:

FOCAL TOPIC	WORKSHOP – COURSE – CONFERENCE
Native species reforestation and restoration of tropical forests	Technical Aspects of Plant Material Production (LERF, CIPAV, FEDEGAN)
Integrating trees and forests into degraded landscapes	Ecological Restoration Strategies in Cattle Ranching Landscapes of the Azuero (APASPE)
Financing for conservation and restoration projects	Economic Tools and Payment for Ecosystem Services for the Cali River Watershed (CIPAV)
Integrating trees and forests into degraded landscapes	Monitoring Areas Undergoing Ecological Restoration (CEPAN/IAvH)
Watershed restoration	Watershed Management for Ecosystem Services in Human Dominated Landscapes of the Neotropics (STRI)

According to Saskia, the Leadership Program is what distinguishes ELTI from many other training organizations. Too often, she explained, "people who take a course, receive a certificate and put it on the wall or save it and then it is over." Instead, to promote continuity, ELTI's Leadership Program is designed to provide follow up support and engagement with program alumni to address the practical elements of implementation and sharing of knowledge learned during the initial training course. Not all participants are in the position to put their knowledge into practice in a concrete project, but the Leadership Program offers the additional support needed for those who wish to do so. ELTI provides technical and financial support for Program alumni initiatives, as well as mentorship opportunities to advance their professional development[13] – for example through assisting alumni to present their work at conferences, such as the SIACRE congress.[14] In addition, the Leadership Program provides alumni with a network of contacts and resources to facilitate the exchange of ideas and knowledge such as, ELTI's Tropical Native Species Reforestation Information Clearinghouse, which provides access to and summaries of relevant articles and reports that are usually not easily found on the internet.[15]

Saskia shared two examples of the successful combination of ELTI's Training and Leadership Programs.

Silvopastoral Project in the Azuero Peninsula of Panama

The first example is located in one of the most deforested and degraded areas of Panama, the Azuero Peninsula. From 1950 through 2010, widespread clearing for agriculture and conventional ranching practices resulted in a loss of 40% of the peninsula's forest cover. In 2009, at the request of a group of cattle ranchers, ELTI organized a workshop on "Native Species Reforestation, Agroforestry and

13 For more information visit www.elti.org

14 Iberoamerican and Caribbean Society of Ecological Restoration.

15 http://reforestation.elti.org/

Silvopastoral Systems," designed for cattle producers interested in improving productivity and recovering environmental services on their farms and ranches. After the workshop, many producers expressed interest in learning more about this topic. Through the Leadership Program, ELTI organized another event for this group of interested producers: a trip around the country to visit demonstration farms that had already established SPS. Saskia pointed out that this farmer-to-farmer exchange provided a great opportunity for the participants to learn from and share experiences with other producers. She explained that this type of peer-to-peer learning activity can often have an even greater impact than a single training course because "the information exchanged between fellow producers is better received than information coming from an outside instructor at ELTI."

With the support of the Leadership Program, the producers from Pedasí, a municipality in the Azuero Peninsula, grouped together into the aforementioned association APASPE. Through ELTI's Leadership Program, they were provided mentorship on the ways to become formally recognized by the government of Panama and to apply for funding. APASPE applied for and received funds from the Global Environment Facility's Small Grants Program (GEF-SGP). As of April 2015, APASPE has received two rounds of funding from the GEF-SGP and has implemented their projects on approximately 40 hectares of land, achieving a drastic improvement in the food security of its members. Also, the producers have received hundreds of visitors to their farms and are recognized as environmental leaders within and outside of their communities.[16] [17]

16 Slusser, J.L., Calle, A. and Garen, E. (2014); "Increasing local capacities in rural Panama" en Chavez-Tafur, J. and Roderick J.Z. (eds.); Towards Productive Landscapes,Tropenbos International, Wageningen, the Netherlands. xx + 224 pp. http://www.etfrn.org/file.php/314/etfrn-56web.pdf

17 Slusser, J.L., Calle, A. and Garen, E. (2014); "Sustainable ranching and restoring forests in agricultural landscapes, Panama" en Pasiecznik, N. and Savenije, H. (eds.) Effective Forest and Farm Producer Organizations. Tropenbos International, Wageningen, the Netherlands. vi + 218 pp. http://www.etfrn.org/file.php/316/etfrn-57.pdf

Payments for Ecosystem Services in Colombia Project

The second example is the story of an individual ELTI alumnus, Víctor Galindo. An employee of CIPAV, Víctor participated in two courses organized by ELTI and CIPAV in 2011, "Strategies for the Sustainability of Connectivity Corridors" and "Economic Tools and Payment for Ecosystem Services for the Cali River Watershed." Through these courses, Victor increased his knowledge and later worked, with the help of other organizations and governments, to help create a PES program involving 25 property owners with a total of approximately 100 hectares. This PES program has already been sharing and disseminating practical information throughout many local communities and is currently considering an expansion to involve more property owners.[18]

Saskia also explained that ELTI has had to address challenges during the implementation of its programs. Unlike programs that teach full-time students, the design of training and capacity building activities for public officials, farm managers and other practitioners must be designed to accommodate the schedules and limitations of working professionals who have to find additional time to participate and carry out activities. In addition, Saskia pointed out that, while important, collaborations with other organizations, such as government agencies can be laborious if these organizations require going through long bureaucratic processes or other lengthy steps.

Finally, Saskia described that, despite being a priority for ELTI, it is always a challenge to figure out how to be able to financially and logistically support an ever-increasing pool of program alumni interested in the Leadership Program. Although follow-up with alumni can be challenging, she explained that "it is very gratifying to help alumni and hear back from them about how they have applied the knowledge learned in the program. For example, we recently

18 http://elti.yale.edu/impacts/forest-restoration-cali-river-watershed

learned that a program alumnus has created an organization to conduct reforestation activities with a group of local children. There are many other examples."

Saskia finished the presentation with a discussion of the results that ELTI has achieved to date. Through its training programs in the Neotropics, as of April 2015, ELTI has delivered 47 events and has trained over 2,200 people on strategies for tropical forest restoration and conservation. Also, the projects implemented by the program alumni have achieved the restoration of many degraded lands, developed national legislation and carried out other initiatives. As with the formation of APASPE and project conducted by Víctor Galindo outlined in this summary, the ELTI Training and Leadership programs creates a multiplier effect by which participants influence restoration and conservation efforts at many different levels. These achievements led ELTI to expand on its program evaluation strategy, and soon ELTI will launch a new monitoring and evaluation process. The hope is that this process will allow ELTI to learn from program alumni about their achievements and ways improve its techniques for capacity building, thus further helping participants and alumni to advance the protection, restoration and management of degraded landscapes in tropical forests.

PRESENTATION #3

Online capacity building: new tools and strategies for distance learning

Gillian Bloomfield

ELTI

Gillian Bloomfield, coordinator of the Online Training Program of the Environmental Leadership and Training Initiative (ELTI),[19] presented the strategy used to launch ELTI's Online Training Program as well as the lessons learned from the program in its first years of operation.

After five years of experience through ELTI's field training courses and other events in tropical countries,[20] in 2011, ELTI established a new Online Training Program. Similar to the field program, the online program is designed to build capacity for the conservation and restoration of human-modified landscapes in the tropics. The program is specifically designed to complement ELTI's field program with a suite of training opportunities via the internet provided to a new and previously unreached audience, those that may have difficulty in attending traditional field courses. By offering online training courses, ELTI has expanded its reach to a more global audience that accommodates the schedules of a diverse array of participants.

According to Gillian, an essential step for initiating a successful Online Training Program was the extensive process of research and planning carried out during the 8 months prior to the development of the first course. In the initial phase, ELTI researched other online programs focused on environmental themes and directed to an international audience. As coordinator of the program, Gillian personally participated in three online courses with similar themes in order to be able to experience the courses from the perspective of a student. Also, ELTI interviewed coordinators of other online programs to understand their experiences and to inquire about tools and techniques for online teaching. After analyzing the collected information, ELTI developed a questionnaire that was sent to past

19 ELTI is a program from the School of Forestry and Environmental Studies at Yale University.

20 See Presentation 2 for more details.

participants, instructors and partners of the ELTI Neotropics and Asia field training programs. As Gillian explained, the responses obtained through the questionnaires were very valuable for understanding their preferences regarding the content, structure and tools to be incorporated in the new program. In addition, it allowed ELTI to have a better understanding of the participants' concerns and receive helpful suggestions.

The results of this initial investigation, Gillian explained, solidified ELTI's confidence that there would be great interest in online courses on themes of restoration and management of tropical forests. With this information ELTI decided on the following approach:

- The material should be presented through a diverse portfolio of educational tools;
- The themes should be divided into weekly modules;
- The majority of the activities should be carried out "asynchronously" – or on a flexible timeline – but with deadlines each week;
- The homework should be oriented towards providing practical skills related to the individual interests of the participants; and
- At the end of the course, certificates of participation should be given to those who completed all of the activities.

Additionally, the results led to the goal of developing a diploma or certificate program on the restoration and management of tropical forests, which is still in the development phase.

Keeping this in mind, ELTI developed its first online course titled "Introduction to the Restoration of Tropical Forests in Human-Modified Landscapes." The course was divided into six modules, one module per week presenting the ecological and social considerations and a range of restoration strategies. These programs provide the participants with an array of strategies, ranging on a continuum

from passive to active, from more conservation-based restoration activities such as the establishment of forest reserves, to more agroecology-based strategies such as the integration of trees into crop or ranching lands. Likewise, the online courses offer a variety of formats, including: video presentations featuring recognized experts, interactive presentations that synthesize the science and theory; case studies from ELTI's partners, including case studies of restoration at ELTI's field training sites; and live video-conferences that take place multiple times during the course.

The majority of the online courses have been offered by ELTI with full or partial scholarship thanks to the financial support of Arcadia.[21] Gillian explained that ELTI carries out a careful process of selection and acceptance of those participants who clearly demonstrate their interest and ability to implement what they learn of land management on-the-ground. Unlike the Massive Open Online Courses (MOOCs) offered by other universities, the online courses offered by Yale University via ELTI stand out because of a model of small class sizes (20-30 participants per expert instructor), the high quality of personal attention and the diversity of contributors. According to Gillian, this allows for the depth and quality of the training achieved in ELTI's courses.

Next, Gillian explained that as of April, 2015 the introductory restoration course had been offered five times: three times in Spanish for a Latin American audience, one time in Portuguese for a Brazilian audience and one time in English for an audience in Asia.[22] Also, ELTI offered in Spanish a more advanced version of the course titled: "Training for Trainers of Restoration" specifically for a Latin American audience. Since the launch of the first online course in May, 2013, until April, 2015, the program trained over 200

21 http://www.arcadiafund.org.uk

22 In July 2015 ELTI offered the course in Portuguese and Spanish for participants from Brazil and other Latin American countries, and other courses are planned for 2016 and beyond.

professionals from more than 20 countries, which represent diverse sectors including NGOs, the private sector, community groups and associations, public-private consortiums, financing agencies and local, regional and national governments.

Key aspects for success

Gillian presented various lessons ELTI has learned on how to deliver a successful online training course. From her point of view,

the most important aspect of the program is the incorporation of practical topics into the course design. The courses offered provide practical information that is meant to be put into practice in the field. From the first module onward, the participants relate the content to a final project, which consists of the development of a restoration management plan for the restoration of a specific site of personal or professional interest. During the six weeks of the course, the homework requires that the participants evaluate and write about how the course content relates to their selected restoration sites.

Gillian also mentioned that as part of the development of their restoration management plan, the participants are asked to complete literature reviews, for which the following resource is offered: the Tropical Native Species Reforestation Information Clearinghouse[23] (TRIC), which gives students access to information that is usually difficult for the public to access. In addition, the participants receive comprehensive and constructive feedback on their work, provided by the other course participants and course instructors experts who have doctorates in forest ecology and restoration. These instructors provide participants with weekly comments and detailed feedback on the drafts of their restoration management plans.

Gillian commented that the second aspect that has led to the success of the program is the great diversity of presenters and contributors; this diversity is even more possible in the online course format as compared to the field courses. The core content of the courses are designed and delivered by a combination of the ELTI staff and steering committee, other professors at Yale University and Yale graduate students. Furthermore, the courses are enriched by the diversity of the international case studies and the conferences provided by ELTI partners and other invited experts from a diverse group of institutions. The majority of the partners that participate in the online courses have also been collaborators in the field training programs in Asia and the Neotropics. According to Gillian, the

23 http://reforestation.elti.org/

participation of ELTI partners has both helped ELTI and its course participants and has allowed the partner organizations to share their successes and restoration strategies with a global audience.

The third aspect that Gillian highlighted as key to the success of the ELTI Online Training Program had to do with the attitude of "customer service" and the flexibility given to the participants, which has added to the high retention rates for each course. Typically, subsidized online courses have a high drop-out rate. However, the online courses offered by ELTI have a completion rate of approximately 75%, which is very high for the field.

According to Gillian, this high retention rate is thanks to the personal attention offered to the participants. For each course, ELTI has facilitators that ensure continuous communication with the participants, sending them news, reminders and feedback. There are deadlines for the homework submissions each week, and if students fall behind, the facilitators will continue communicating with them persistently, while also allowing flexibility and special arrangements to be made for deadlines. For example, if unforeseen circumstances arise and a participant is not able to meet a deadline, the facilitators discuss individually with the participant and give them alternative dates to deliver the assignment. In general, ELTI strives to maintain a balance between flexibility and formality regarding the deadlines for submissions.

Key challenges identified

In terms of the challenges, the first challenge Gillian mentioned has been in achieving a greater participation of students during the "live" sessions. These sessions are spaces for the instructors and students to be able to interact directly. ELTI began offering one or two live sessions per course, but recently has increased to three or four sessions per course because the participants commented that they wanted more opportunities to communicate with their fellow

classmates as well as the guest experts. However, in the majority of the sessions, only about half of the participants have been able to attend. A challenge is to be able to program the sessions during a time when the majority of the participants and the guest experts can participate. One strategy will be to provide standard times for live sessions during the application phase so that interested applicants can reserve the times in advance. Additionally, Gillian mentioned that despite the fact that in the past two years the software options for the live sessions have improved a lot, ELTI still experiences technical difficulties in maintaining dialogue and interaction due to the quality of the microphones and webcams as well as quality differences in internet connection across the participants.

Another challenge has been to maintain contact with and to follow up with the participants after the course. ELTI has created a Facebook page, which is used by approximately 40% of the participants; however, ELTI is always searching for new ways to improve participants' opportunity for collaboration after the courses have ended.

Results

Gillian highlighted that the ELTI online courses were designed to best allow the participants to apply what they learn and generate impact in the field of restoration. In this sense, she expressed her excitement that in the exit surveys of the course, 99% of the participants expressed their plans to apply what they had learned through 1) the incorporation of the knowledge in their work (64%), 2) the modification of an existing restoration project (17%) and 3) the implementation of a new restoration project (14%). Additionally, in March of 2015, ELTI carried out follow-up survey of program alumni, and those surveyed indicated that they had applied the knowledge obtained through the courses to modify 42 existing restoration projects and to implement 16 new restoration projects. Likewise, 69% mentioned that they had shared the information that they learned with other people and 55% mentioned that they had worked to make changes within their own organization.

To illustrate the experience of the participants, Gillian shared a comment of a Costa Rican participant:

"To begin to relate the theory from the first week with the final project allows the student to establish a direct relationship between what he/she is learning and reading in order to bring it into practice."
- S.C. Elizondo.

Next steps

Gillian emphasized the necessity to increase the impact of ELTI through more follow-up engagement and support for program alumni. Based upon the results of the impact assessment, 83% of the participants mentioned that they needed additional support to put into practice what they had learned. Likewise, 40% identified that they required more training and 20% said they needed more individual mentorship and advice from experts.

She concluded by mentioning that ELTI has decided to offer this support in different forms 1) through its Leadership Program, 2) by increasing course offerings about monitoring, financing and the socio-cultural aspects of restoration, and 3) by establishing networks and opportunities to for alumni share and exchange experiences after the courses. Also, she expressed that in the future ELTI plans to be able to offer a diploma or certificate that includes the following themes:

- Introduction to restoration and/or training for trainers
- Monitoring for areas under restoration
- Sustainable agricultural landscapes
- Participatory research and community engagement
- The business tools and financing options for restoration projects

PRESENTATION #4

Strategies and innovations necessary for capacity building in ecological restoration – the experience of the Brazilian Atlantic Forest Restoration Pact

Pedro Brancalion

University of São Paulo

Pedro Brancalion, research professor at the "Luis de Queiroz" Agricultural School of the University of São Paulo, presented a conceptual framework for the development of capacity building initiatives on ecological restoration. He then demonstrated its application by providing a case study based upon his experience working with the Atlantic Forest Restoration Pact (*Pacto pela Restauração da Mata Atlântica* in Portuguese). Pedro presented his vision of capacity building "as a tool to transform the way in which we conduct and monitor a restoration project." He expressed that by engaging in capacity building, restoration organizations can achieve a greater impact by involving the different stakeholders and transforming information into practical application.

In his case study about the AFRP, Pedro began with contextual information about the Atlantic Forest, one of the most endangered tropical ecosystems of the world, which exists in Brazil, Paraguay and Argentina. This ecosystem has been severely deforested and is highly fragmented due to deforestation generated by development and population growth.

In Brazil, 500 years ago, the Atlantic Forest covered 15% of the entire country. Now only 7.3% of this once vast forest remains. Despite its reduced size, this forest is considered to be a global priority for conservation as it harbors high biological diversity, similar to that of the Amazon.[24] This forest has been heavily affected by concentrated Brazilian industrial development and population growth due to its location along the Brazilian coast. For example, 60% of Brazil's population resides in coastal megacities such as Rio de Janeiro and São Paulo.

Pedro stressed the importance of restoring the Atlantic Forest due to its biological importance as well as its role in providing ecosystem services to the population, such as water provisioning

24 http://www.mundotnc.org/donde-trabajamos/americas/brasil/lugares/bosqueatlantico.xml

and soil stabilization. Pedro explained that for many decades, various restoration projects have been carried out; however, their effectiveness was limited due to their small scale. In 2009, a group of individuals and organizations decided to create a strong coalition to advance large-scale restoration efforts in the Atlantic Forest, which resulted in the formation of the Atlantic Forest Restoration Pact (AFRP). The objective of the AFRP is to bring together individuals and institutions from diverse backgrounds to restore the Atlantic Forest at a large scale, while also promoting conservation of biodiversity, work and income generation, maintaining and creating payments for ecosystem services and updating agricultural activities to current legal standards.[25] The main target of the AFRP is to restore 15 million hectares of the Atlantic Forest by 2050, which

would correspond to an increase of its forest cover from 12% to 30%. According to Pedro, this is the minimum percentage of the biome that is necessary to maintain adequate levels of biodiversity and provide enough ecosystem services for the population.

Currently, the AFRP has more than 300 member organizations, including governments, private businesses, NGOs and academic institutions. Working under the leadership of the AFRP president Severino Ribeiro of the Center for Environmental Research of the Northeast[26] (elected in 2015), this coalition has great power to transform the Atlantic Forest since it includes high ranking individuals who have power to influence decision making. However, there are still key challenges to overcome such as a lack of technological information on restoration and lack of adequate dissemination of such information.

Pedro explained that, previously, the people who were working on restoration projects did not have much ecological knowledge; there was a substantial gap between the science and the practice. Pedro highlighted the importance of capacity building, informed by cutting-edge science, to spread information and to achieve restoration of the necessary scale and quality. Thus, capacity building can help to strengthen the relationship between knowledge and practice. Also, he stressed that the more the training addresses the entire production chain (or value chain) of restoration, the greater the impact it can have by transforming the market in favor of restoration.

The AFRP has identified many different the stakeholders, including both institutions and individuals, involved in the restoration production chain. With the help of different experts, have identified the gaps in knowledge about ecological theory and the training needs on practical issues. Members of the AFRP have organized a great deal of the information gathered by research and practice into

25 www.pactomataatlantica.org.br

26 See presentation 6.

a book that provides a theoretical basis for understanding the range of restoration activities taking place in the Atlantic Forest. This book is accessible in its electronic version, free of charge, on the website of the AFRP.[27] In addition, they developed a Monitoring Protocol for Restoration Projects, which is also freely available on the website.

As a part of the process of organizing this information, they established restoration experiments and identified sites to test economic models for rural producers. These experimental sites are now used in restoration courses to demonstrate scientifically sound tools. Some of these sites were established through institutional agreements between various partners working on restoration, and some sites are on private properties of members of the AFRP who wish to contribute to the movement and, therefore, have helped to establish the demonstration sites.

Pedro explained that, initially, the AFRP conducted its trainings using a small group of experts that were available to participate in the training courses, but little by little they added to their programs with new experts and organizations such as ELTI, CEPAN and CIPAV. These collaborations have been important to bring innovation into the AFRP and to promote other benefits of informational exchange. Thanks to this collaboration, he explained, today there are many more groups participating in the trainings.

To date, the AFRP has primarily offered field courses, and Pedro recognized that they still do not have the structure in place to offer online courses, such as those offered by ELTI. However, he expressed the sentiment that online courses will be necessary to be able to respond to the demand for training required in the Atlantic Forest. In addition, he emphasized the need to use technology to disseminate information and to facilitate interactions among people.

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27 http://www.pactomataatlantica.org.br/publicacoes

He went on to highlight the importance of focusing on the training of different target audiences including landowners, but especially focusing on strengthening the capacity of the stakeholders involved in the entire restoration production chain. He affirmed the need to ensure that all stakeholders have access to adequate information and a clear understanding of how to carry out restoration, from practitioners and private businesses to indigenous groups and rural producers. If the entire range of stakeholders is not involved, it will be difficult to achieve a true transformation of the production chain, he expressed. However, he accepted that this challenge is not simple, as each stakeholder has unique and specific capacity building needs.

Based upon his experience with the Pact, Pedro then presented a conceptual model for capacity building consisting of four main steps:

1. Identifying information needs and knowledge gaps
2. Organizing information into the training materials or curriculum
3. Identifying and mobilizing target audiences for the training
4. Planning and implementing trainings

The first step refers to the necessity of understanding the needs for training and the level of knowledge of the people in the specific region in order to tailor capacity building to a given context. The second step consists of searching for sources of information, often widely dispersed, and compiling it for easy use. Some of the sources of information that should be consulted are: research institutions, practitioners and experts, reports, books that provide the theoretical basics and experimental sites where the techniques of restoration have been put into practice. Those experimental sites can be considered educational materials, which Pedro calls “living knowledge”. The third step, refers to the process of securing the specific audience, whether it be government, rural and indigenous peoples, or practitioners. That audience will determine the format of the training.

During the final step on planing and implementation of the training, Pedro explained that the approach should be adapted to the specific audience and their requirements identified in earlier steps. For example, he explained that online courses may serve government officials or people coming from many different countries. Meanwhile, he suggested that field courses would be more appropriate for indigenous communities and field workers. Also, Pedro commented that this stage can provide the opportunity for learning and identifying new needs for knowledge.

Pedro suggested that pathway could help serve others looking to make capacity building into a transformational experience. He pointed out the importance of defining the structure of the training in order to be effective; that is to say: to identify the objectives and needs of the different stakeholders so that the capacity building provides them with the right tools to succeed.

Likewise, he mentioned that more educational materials should be developed on themes of restoration because, unlike for agriculture and cattle ranching, didactic educational materials are still very scarce. Therefore, he emphasized the necessity of creating an agenda for the collective development of training materials. Also, he emphasized his earlier point that it is necessary to focus training efforts on all of the stakeholders within the value chain to achieve a common understanding. Finally, he stressed the importance of advancing the development of capacity building platforms, such as ELTI's online training program, to allow for increased dissemination and a wide reaching amplification of training efforts.

PRESENTATION #5

EcoLogic and AJAASSPIB: The impact of our work

Gabriela González García

EcoLogic Development Fund

Carlos Estrada

AJAASSPIB

EcoLogic

EcoLogic

Gabriela González presented on the work of the EcoLogic Development Fund (referred to as EcoLogic) to support rural communities in the protection and restoration of ecosystems in Mexico and Central America. At the time of the conference, Gabriela served as EcoLogic's Regional Program Director, managing a portfolio of projects in Mexico, Guatemala, Belize and Honduras. She was joined by Carlos Estrada, the President of the Board of Directors of the Association of Water Committees of the Southern Sector of Pico Bonito National Park (AJAASSPIB – acronym in Spanish), a strategic partner of EcoLogic. He described the partnership between AJAASSPIB and EcoLogic to build capacity for the conservation of water resources in the municipality of Olanchito, Honduras.

EcoLogic is a non-governmental organization created in 1993. Its mission is to empower rural communities and indigenous groups to restore and conserve Central American and Mexican tropical ecosystems. While its headquarters are in Cambridge, Massachusetts, Gabriela works in its regional office in Quetzaltenango, Guatemala, established in 1999. The regional program works in Central American countries which have high levels of biodiversity, significant threats, community interest and local support.

EcoLogic currently has eight active projects in four countries. Specifically, in Mexico there are two projects: one in the town of Cojolita in the Sierra Lacandona of Chiapas; one in the Sierra Norte of the state of Oaxaca, near La Chinantla, focusing on the protection of the watershed of the Papaloapan River. Near the border between Belize and Guatemala there is a binational project in the Sarstoon Temash Park where EcoLogic promotes the protection of coastal ecosystems, mainly dwarf mangroves. In Guatemala, there are three projects in mountainous zones which are very difficult to access: in Totonicapán, in Huehuetenango and in Quiché. EcoLogic supports the communities of these mountainous zones in sustainable forest

EcoLogic

management, watershed protection and restoration and promotion of agroforestry practices. In Totonicapán, where the majority of the population is comprised of indigenous Maya K'iche'[28] people dependent upon the forest for their subsistence, EcoLogic focuses on the preservation and appreciation of the history, traditions and governance of the K'iche' indigenous people. In Honduras, EcoLogic promotes ecological restoration of the Pico Bonito-Texiguat biological corridor in the municipality of Altántida. Also in Honduras, in the municipality of Olanchito, EcoLogic's work consists of strengthening the governance of the watershed committees to achieve holistic ecosystem management.

Ecologic works with organized communities to help strengthen their institutions. Their work focuses on the following areas:

Leadership and Environmental Empowerment: EcoLogic develops relationships based upon cooperation and confidence. Through consultations with the communities and responding to their needs, they create project diagnostics to later develop action plans in direct coordination with the communities.

Management of Local Water Resources: EcoLogic supports communities in the sustainable management of their water resources and in ensuring local financial sources to manage and protect natural resources. They work on improving access to drinking water supplies by improving the management of distribution systems.

Conservation and Management of Forests: EcoLogic works with local partners to manage and protect of natural protected areas and to reforest for watershed protection. EcoLogic also works to improve the management of wood resources by installing and promoting the use of efficient stoves, thus reducing the demand for firewood.

Payments for Ecosystem Services: EcoLogic supports the local

28 Quiché (or k'iche') is one of the native Mayan towns of the Guatemalan highlands. Quiché is also the name of their language, of their nation (in pre-columbian times) as well as the name a Guatemalan department.

management of compensation programs for water resources and the establishment of carbon credits for reforestation and restoration projects.

Rural Sustainability: EcoLogic promotes food security through training on agroforestry systems and sustainable agricultural practices, as well as providing strategic consulting for environmentally-minded community businesses in their initial stages.

One of the fundamental pillars of EcoLogic's philosophy is that the people living near threatened ecosystems must be strategic actors in the long-term protection and restoration of those areas. Also, the organization believes strongly that communities should have access to the necessary tools to make protection and restoration possible. Therefore, EcoLogic partners with communities to work together on:

- Creating solutions to local ecological problems,
- Strengthening communal leadership,
- Providing technical and financial assistance, and
- Creating bridges between local initiatives and national and international resources.

For EcoLogic, capacity building is an essential tool to reach their goals. For example, one of the capacity building methods they employ is a system of rural extension work in which EcoLogic chooses communal leaders, recommended by their fellow community members, to go through training exercises to learn how to train others. Gabriela explained that another important tool in the training process are the arts. In training programs with children and young adults, some of their most successful community activities are courses in poetry, dance and music, including composing and singing songs with environmental themes, such as restoration-themed hip-hop songs. Gabriela noted that training children is key, and that this investment will pay off in terms of ecosystem conservation for the long run.

In addition to trainings, EcoLogic organizes learning exchanges. These aim to spread knowledge about environmental management and, with it, to strengthen communities and local governments in their ability to conserve and restore water resources. They find that this training strategy is most effective when experiences are shared between colleagues. In other words, Gabriela described that "the message is better received from community member to community member, rural farmer to rural farmer, or decision maker to decision maker." EcoLogic also carries out important work with women and holds trainings specifically for women. Gabriela stated that in many in rural zones of countries, such as Guatemala or Mexico, the women are difficult to reach because either the men may not permit the women to attend or simply because the women do not speak Spanish. Gabriela stressed that empowerment of women is vital not only for reasons of social inclusion, but also because this generates an important multiplying effect within the communities. Once women are trained, they share their knowledge with their children, sisters, aunts, neighbors and friends.

Gabriela discussed the values that govern the organization and are necessary for conducting activities with a long-term vision. She highlighted the values of community-based conservation, solidarity, justice, honesty, transparency and impact. EcoLogic places emphasis on the measurement of results in order to evaluate them. Also, to carry out ethical work in solidarity with the communities, EcoLogic feels that promoting communal leadership and participation is the only way to ensure that the interests of the communities are addressed equitably. Regarding this point, she noted the importance of focusing on gender. On many occasions the women are in greater need of training and empowerment to achieve the desired impact in environmental conservation.

Next, Gabriela presented the results and impacts of EcoLogic's work in a variety of project areas. Since 1993, the organization has collaborated with 627 communities and organized 1,260

community workshops with approximately 18,900 participants. In terms of protection and restoration of forests, they have trained 840 community members to be forest guards and have also trained 300 farmers in agroforestry techniques. In addition, they have planted over 1.3 million trees in reforestation, forest restoration and watershed restoration projects and constructed 2,500 efficient firewood-saving stoves. In terms of water management, they have put 18,510 hectares of various watersheds under management by community committees and have provided technical assistance and support for the establishment of 160 water committees.

To conclude her section of the presentation, Gabriela described the efforts of EcoLogic to provide support and strengthen the capacity of their local partner organization, the Association of


EcoLogic

Water Committees of the Southern Sector of the Pico Bonito National Park (AJAASSPIB – acronym in Spanish). She described the international recognition that AJAASSPIB has received.[29]

Next to present was Carlos Estrada, an agricultural engineer by training, president of the Association of Ranchers of Olanchito and incoming president of the Board of Directors of AJAASSPIB.

Carlos began his presentation discussing the mission, structure and organization of AJAASSPIB. Founded in 2003, the Association includes 28 community level 'water committees' in the Southern Sector of the Pico Bonito National Park located in the Northern part of Honduras. These water committees' goals are to spread awareness, improve understanding and improve the use, care and sustainable management of the water systems of the area. AJAASSPIB's mission is to build cooperation between these committees and help them gain influence in the local government in order to support efficient management of drinking water systems and better organization of the microwatersheds. AJAASSPIB's area of influence is concentrated in 14 microwatersheds within the municipality of Olanchito in the Department of Yoro.

Carlos described that as a volunteer organization, capacity building is a key component of AJAASSPIB's work in order to disseminate information across the 28 member communities on the care and management of their water resources. The local committees are in charge of supervising the management activities of the microwatersheds, maintaining the water supply systems and administrating the finances and collection of fees at the local level. The households within the communities of each of the 28 member committees pay a water-use fee to the local water committees. The committees then direct these funds towards reforestation, forest

29 In 2011 an international insurance company "Swiss RE" gave the association AJAASSPIB - Ecologic the "Swiss Re 2011 Sustainable Watershed Management" award and in 2012, AJAASSPIB was selected as one of the 25 winners of the Equator Prize, organized by the United Nations Development Programme.

conservation and monitoring activities in each microwatershed. This is conducted with the support and facilitation of EcoLogic.

Within this framework, there is a focus on building the capacity of community leaders because, according to Carlos, "this is the way for community associations to prepare for their future and to achieve true sustainability." AJAASSPIB has developed trainings on different topics focused on conservation in microwatersheds. They have conducted workshops for the construction of nurseries, plant production, reforestation, construction of firebreaks and solutions to socio-environmental conflicts, among others. They have constructed 592 improved stoves, which impacts forest conservation positively due firewood savings, thus helping the community meet its fuel needs.

Another part of the solution for microwatershed conservation has been helping communities purchase land to set aside as water production zones. Carlos explained that the association does not actually carry out the purchases, but it does advise and support community members in negotiations with landowners. The goal is not just to purchase land, but to also to obtain declarations from the government to officially convert that land into strict water production and conservation zones. In 10 of the 14 micro-watersheds where AJAASSPIB operates, they have succeeded in receiving official government declarations designating these areas as protected forest reserves.

In recognition of these communities' work in the management of the microwatersheds, AJAASSPIB currently has a Joint Environmental Management agreement with the municipality of Olanchito (home to approximately 42,000 inhabitants) and EcoLogic, to give technical advice to the municipality regarding the conservation and organization of the microwatersheds formed by the Uchapa and Pimienta Rivers. These rivers supply water to the city, yet there had not been any specific authority charged with

managing the water supply. Therefore, members of AJAASSPIB have brought their experiences working in rural areas to the urban sphere to support the municipality in the process of formalizing and organizing the sustainable management of water from these rivers.

Additionally, AJAASSPIB has developed models for community-based environmental planning. These models guide communities through the process of reflecting upon their current situation, visualizing their needs and defining the desired future objectives in a participatory manner, involving children, youth and adults.

To conclude, Carlos described other AJAASSPIB activities implemented to actively involve the community in environmental protection, namely,

- Designing and creating educational materials with young people;
- Consolidating the Municipal Environmental Fund, established in January of 2015, in order to purchase priority conservation and restoration areas and to finance other activities;
- Using a diverse array of media sources; and
- Monitoring and permanently protecting water supply systems through training and coordination with government entities, private agencies and other NGOs.

EcoLogic

Presentation #6

Capacity building for mobilization of financial resources for ecological restoration

Severino Rodrigo Ribeiro Pinto

Center for Environmental Research of the Northeast

Severino Ribeiro Pinto is a researcher at the Center for Environmental Research of the Northeast[30] (*Centro de Pesquisas Ambientais do Nordeste* in Portuguese), and he was recently named National Coordinator of the Atlantic Forest Restoration Pact.[31] Severino spoke about the financial opportunities generated through capacity building in ecological restoration. He emphasized that organizations should not only disseminate information relevant to the theoretical and practical ecological knowledge regarding restoration, but also teach and promote the potential economic benefits of restoration. The Center for Environmental Research of the Northeast (CEPAN) promotes environmental conservation in Brazil, particularly in the Biodiversity Corridor of Northeastern Brazil, one of the three corridors of the Atlantic Forest recognized to harbor endangered species and high levels of endemism.

To understand the importance of restoration efforts in re-establishing conservation value in tropical countries, Severino explained the effect of the intensity of ecological disturbances on the conservation value of the landscape. He showed that larger disturbances bring about more rapid loss of ecosystem functions in human-modified landscapes and described a threshold by which such lands have lost their capacity to provide ecosystem services and to support biodiversity. Currently, he described, the great majority of landscapes in the Atlantic Forest have passed this threshold of disturbance and have a low conservation value. Therefore, restoration represents a great opportunity to recover the conservation value of those landscapes.

In light of the current state of the Atlantic Forest, Severino stated that restoration should be oriented towards taking advantage of environmental opportunities as well as social and economic opportunities. Severino sees this as is the main difference between restoration projects and other types of environmental work – that restoration projects can lead to measurable economic impacts such as increasing jobs and incomes in rural and marginalized communities.

30 http://www.cepan.org.br

31 For more information on the Atlantic Forest Restoration Pact see presentation 4.

To achieve these impacts, it is essential to understand the full functioning of the restoration production chain, which consists of the entire value chain of activities that make restoration possible. There are two main types of stakeholders within these chains. First, 'input generators', including producers, seed collectors, plant graft producers and nursery workers. Secondly are the 'service providers' which include businesses a) that purchase these inputs and provide services to implement restoration, and b) businesses that purchase products and ecosystem services generated by restoration activities. In particular, this category includes project implementers, consulting firms, organizations working on planning and monitoring

of restoration activities, businesses that sell wood products and medicines, organizations selling carbon credits and other entities simply looking to "green" their image.

The different stakeholders within this production chain will benefit to a greater or lesser extent according to the socio-economic and political conditions of each region. For example, benefits will differ depending on the presence or absence of legal frameworks for the promotion of payments for ecosystem services programs. Severino emphasized the importance of understanding how to promote economic opportunities associated with restoration and how to generate favorable conditions that stimulate the development of restoration-based businesses. The goal should be to establish a positive cycle by which income in communities increases at the same time as forest cover.

Unfortunately, explained Severino, such activities are often neglected by ecological restoration researchers. If restoration does not generate income for small producers, farmers and rural communities, it is very difficult for those groups to commit to restoration in the long term. Therefore, capacity building should be a key tool to achieve this objective. He stated that in addition to the technical environmental themes, restoration capacity building activities should include two critical components:

1. Economic and financial content:

The plans should address issues of entrepreneurship such as business planning, strengthening contact networks, marketing strategies, customer service and market analysis.

As an example, Severino highlighted a collaboration between CEPAN and the Federal University of Pernambuco. These organizations supported a group of small farmers in the northeast part of Brazil in the production and commercialization of seedlings of native species. They included in their capacity building program information on the mobilization of financial resources. They offered

the farmers technical and administrative training in the processes of producing and growing seedlings, leading to the creation of the first native seedling producers association for forest restoration in the northeast of Brazil. The organizations supported them in the creation of the association's structure and governance, involving 10 small nurseries and generating 40 jobs. Severino explained that this is an especially exciting achievement considering that this project is taking place in the poorest region of Brazil. This case demonstrates that it is possible to generate jobs and income in one of the 'links' of the restoration production chain, ensuring a series of technical standards regarding the quality of seedling and graft production of native species. This work is outlined in two scientific articles accessible to the public: (Melo et al. 2013)[33] and (Pinto et al.).[34]

2. Content on governance and the creation of public policies:

Restoration at a landscape level cannot be achieved without the existence of a favorable political climate, including adequate policies, trained government officials and personnel, social movements and the establishment of a forest product market, especially for small scale producers.

In conclusion, Severino described two important goals for restoration capacity building and education. On one hand, individuals and organizations working on restoration must possess the technical and methodological knowledge necessary for ecological restoration. However, of equal importance, they must understand and apply the concepts of economy, business and finance within the framework of restoration.

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33 Melo, F.P.L., Pinto, S.R.R., Brancalion, P.H.S., Castro, P.S., Rodrigues, R.R., Aronson, J. and Tabarelli, M. (2013); "Priority setting for scaling-up tropical forest restoration projects: early lessons from the Atlantic Forest Restoration Pact," Environmental Science & Policy, Vol. 33, pp. 395–404.

34 Pinto, S.R., Melo, F., Tabarelli, M., Padovesi, A., Mesquita, C.A., de Mattos Scaramuzza, C.A., Castro, P., Carrascosa, H., Calmon, M., Rodrigues, R., César, R.G., and Brancalion, P.H.S. (2014) "Governing and Delivering a Biome-Wide Restoration Initiative: The Case of Atlantic Forest Restoration Pact in Brazil," Forests, Vol. 5, pp. 2212–2229. http://www.mdpi.com/1999-4907/5/9/2212


EM RESPONSABILIDADE

PRESENTATION #7

Training in Forest Restoration – The Nature Conservancy of Brazil

Marina Campos

The Nature Conservancy, Brasil

TNC Brasil

Marina Campos, Coordinator of Information Dissemination on Forest Restoration for *The Nature Conservancy* (TNC) in Brazil, presented on the past six years of TNC's capacity building work for restoration in Brazil. For these activities, TNC has been collaborating with communities with the objective of increasing the area of forest restoration in various regions of Brazil and working specifically on economic activities linked to the restoration production chain.

The mission of The Nature Conservancy is to conserve the lands and waters upon which life depends. TNC considers training a fundamental tool to achieve their institutional goals. Specifically, TNC-Brazil has established programs to organize, provide assistance and develop courses and educational materials to train stakeholders at different levels of the restoration production chain: seed collection, production of seedlings, environmental monitoring and evaluation, forestry restoration techniques and project development, including planning, implementation and monitoring. TNC-Brazil has collaborated in this work with other educational and research institutions.

Through training programs, TNC-Brazil and its collaborators work to:

- Strengthen the restoration production chain through the creation of jobs and income;
- Use economic incentives to increase restoration areas and to promote a better integration of agricultural production and conservation; and
- Improve the efficiency of forest restoration activities in the field through cost-benefit analysis.

TNC-Brazil has developed a series of educational materials to carry out its training programs. These materials have been developed with local partners, governments and educational and research institutions to ensure the integration of the regional aspects

of restoration, biomass regulations and capacity building of local stakeholders and government officials.

To date, TNC-Brazil has published seven manuals to cover different states in Brazil including Mato Grosso, Espirito Santo,

TNC Brasil

Para, Mato Grosso do Sul and three in Bahia, one for each biome present in the state. In addition they have published two informational pamphlets about restoration in general, one pamphlet specifically about Mato Grosso, two practical guides for species identification in Rio de Janeiro and Mato Grosso, respectively, and have developed a restoration kit.

The first species identification guide was developed to aid in the identification of species in a particular region: the Guandu River watershed in Rio de Janeiro. The guide assists in the process of species identification and includes relevant ecological information about each species, such as ecological functional group, flowering period and seed dispersal. This guide also provides information on restoration projects establishment and methods for seed collection, propagation and production. Marina also described TNC-Brazil's "Restoration Backpack," a restoration kit, still in development, which provides in a backpack all the educational material necessary to learn in an interactive manner about the processes of field work needed for restoration in remote areas. The kit also includes a forest model with basic information to teach restoration ecology.

The training results achieved by TNC-Brazil and their partners in the last six years of work consists of:

- Strengthening the restoration production chain in 10 states of Brazil;
- Training more than 600 people, including creating jobs and income;
- Achieving 5,000 hectares restored or in process of restoration;
- Transforming the relationship between communities and the environment, enhancing appreciation of nature and conservation.

To illustrate these achievements, Marina described six projects where, through capacity building, TNC-Brazil has supported the creation and strengthening of cooperatives. These cooperatives have generated work and improved income in communities through the implementation of restoration projects, commercialization of forest products and improvement of farm productivity. Each project has included the training of land owners and community leaders.

Project #1: Cooperative of Reforesters from the Atlantic Forest in the Far South of Bahia (Cooplantar, short name in Portuguese)

This project was created as a joint initiative between the institutional network formed by TNC-Brazil, Instituto BioAtlantica, Conservation International, Instituto Cidade, Grupo Ambiental Natureza Bela, Asociación de Nativos de Caraíva and the Community Benefit Association of Nova Caraiva. The objective is to restore the Atlantic Forest of the Monte Pacoal-Pau Ecological Corridor located in the south of Bahía. In order to implement the project it was necessary to train local people. TNC-Brazil promoted these training activities, which were facilitated by experts from the Forest Ecology and Restoration Laboratory (LERF) at the University of São Paulo.

During the early training process, the community decided to unite and form a cooperative, so in 2006 they formed the organization Cooplantar, a cooperative of fishermen and Caraiva indigenous peoples in Bahia that provides work and income to members of local impoverished communities. Their principal activities are seed collection, seedling production and restoration. To date the co-op has restored 604 hectares.

Project #2:
Cooperative of the Pataxó Indians in the South of Bahía (Cooplanjé, short name in Portuguese)

Founded in 2012, Cooplanjé is a cooperative formed by the Pataxó[35] Indians, who live around the Monte Pascoal National Park located between Porto Seguro and Itabuna in the South of Bahía. They were trained to practice restoration in the aforementioned Atlantic Forest ecological corridor. Before the project, around 100 families survived by illegally harvesting wood to make crafts and artwork. However, Marina explained that, thanks to the financial support provided by the National Development Bank of Brazil, more than 60 families have stopped engaging in this illegal activity and have begun making a living doing forest restoration.

In this Project, TNC-Brazil supported the development of training courses that were facilitated by LERF. Also, the workers from the aforementioned cooperative, Cooplantar, helped train the members of the Cooplanjé cooperative. To date they have restored 220 hectares of land.

Project #3:
Cooperative of Environmental Work for the Reforestation of the Piracaia Dam in São Paulo (Ambiência Cooperativa - short name in Portuguese)

Founded in 2010, Ambiência Cooperativa is a cooperative formed by 22 rural workers from Piracaia-São Paulo. This cooperative was created after a training aimed at restoring the surroundings of the Cachoeira reservoir, one of the reservoirs of the Cantareira System and an important water supply for the city of Sao Paulo. The work of the cooperative is key for forest restoration in this region.

35 "Pataxó" is the name of a native tribe in Bahía, Brazil with a population of 11,800 people.

TNC-Brazil continues to help build capacity of the Ambiência Cooperativa through courses focused on different themes, the most recent being the development of project budgets. Ambiência Cooperativa has restored around 200 ha with the support of the businesses SABESP[36], EM Piracaia, SMA and the Dow Foundation.[37]

Project #4: Cooperative of Agro-ecological Products, Artisans and Cloud Forests in Paraná – (Coopaflora, short name in Portuguese)

Founded in 2006, Coopaflora is a strong cooperative formed by 85 family farmers who have restored around 380 hectares of land with agroforestry systems. While TNC-Brazil did not help to form this cooperative, Marina explained that they have supported and engaged in capacity building with Coopaflora. TNC-Brazil helped train them in restoration strategies using agroforestry techniques for growing yerba mate and medicinal plants. They also helped with the construction of a building used to process and dry the plants grown in the agroforestry system.

Project #5: Support the Forest – Preserving forests. Developing communities (Sustenta a MATA, short name in Portuguese)

The project "*Sustenta a MATA*" was initiated in 2013 with the objective of restoring 130 hectares in 3 states of Brazil: Paraná, Santa Catarina y São Paulo. Marina explained that, in this case, the communities of the project participated in decision making on the restoration models and in the selection of species with economic

36 www.sabesp.com.br
37 www.dow.com/brasil

potential to bring financial returns to land owners during the short, medium and long term. The community was trained and contracted for the project by TNC-Brazil with a timeline of four years to implement the project and carry out the restoration activities. They provided the community with the benefits of improving their properties in accordance with the local legislation as well generating employment and income. TNC-Brazil provided a training at the beginning of the project concerning the selection of species for reforestation. They also carried out a subsequent trainings on project implementation. Local TNC technicians continue to give the community assistance during project implementation.

After two years, Marina said, the project has achieved concrete results by strengthening 13 community nurseries, providing technical support and purchasing all of the seedlings generated by the nurseries. Approximately 100 people involved in the implementation of the project have already seen direct benefits with the increase in income from $300 to $1,000 USD, and there are still two more years' worth of income that they will receive for future maintenance work. Moreover, the project is designed to provide other income opportunities through the sale of the Jussara palm (*Euterpe edulis*) pulp, yerba mate leaves, firewood and native species seeds.

Project #6: Agroforestry Project – MAPSP

This new TNC project was initiated in March of 2015. The project objective is to restore 110 hectares of land around the springs and water bodies of Salesópolis, an important area for the water supply of the city of São Paulo. This restoration will be carried out through the creation of agroforestry systems, with an emphasis on native species with economic potential, especially a fruit tree native to the Atlantic Forest called the Cambuci (*Campomanesia Phaea*).

In conclusion, Marina explained that the future prospects for restoration work in Brazil are very positive because there is a favorable sociopolitical context for this type of work at the national and international level. The new Brazilian Forest Code lays out a national plan for advancing the recovery of native vegetation, and initiatives such as the Bonn Challenge[38] also intensify demand for forest restoration. However, Marina pointed out that many regions do not have the supplies nor the qualified work force to respond to this rising demand for reforestation. TNC-Brazil believes that the best way to attend to increasing demand at the required quality and scale is by training and empowering local people through sharing knowledge and experience.

Marina went on to describe TNC-Brazil's plans to develop a National Forest Restoration Training Plan. Its goal will be to train leaders who will then train other community members, thereby achieving the necessary multiplying effect to meet the rising demand for restoration. Marina noted that conversations with experts from the AFRP as well as other partners such as LERF, have continued to progress. They defined 10 principal themes for the training process and settled on the most appropriate and effective educational materials to develop. However, she said, that idea still only exists on paper because they are still looking for the resources and partners to make it a reality.

38 The "Bonn Challenge" is a global initiative that aims to restore 150 million hectares of degraded land by the year 2020. (http://www.bonnchallenge.org)

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Glossary of Terms

Agroforestry system
A system that integrates trees, cattle and pasture or forage grasses in the same productive system and that works to improve the productivity of a system in a sustainable manner.

Connectivity
The level of movement of species and/or processes within ecosystems. There are two types of connectivity: structural, which is when there is only continuity between ecosystems, and functional, which is when there is also movement of species and processes between these ecosystems. In fragmented landscapes, connectivity is drastically reduced for many species, and the viability of their populations is compromised.

Conservation value
The capacity of ecosystems to provide ecosystem services and to retain biodiversity.

Deforestation
A process generally brought about by human activities, which destroys forest cover.

Degradation (of ecosystems)
The persistent decreasing of the capacity of ecosystems to provide goods and services.

Ecological restoration
An intentional process of initiating or accelerating the recovery of a forest ecosystem after it has been degraded, transformed or completely destroyed by a disturbance.

Ecosystem or Environmental Services
Benefits for humanity derived from the resources and processes generated by a given ecosystem, in this case forests.

Glossary of Terms

Erosion ravines/cave-ins
Deep ditches or gullies created by the repeated erosion of soils caused by the uncontrolled flow of water running downhill (runoff). When the ravines grow they are called cave-ins.

Firebreaks
Areas made of strips of cleared of vegetation that separate different sections of terrain with the goal of reducing and limiting the spread of forest fires.

Fragmentation of forests
A type of habitat degradation that occurs when forests are destroyed in a way that leaves only small and isolated patches of forest, known as fragments or remnants.

Greenhouse Gases (GHG)
Gases whose presence in the atmosphere contributes to the phenomenon known as the greenhouse effect.

Intensive silvopastoral system (iSPS)
An agroforestry arrangement that combines agro-ecological cultivation of a high density of forage shrubs (over 8,000 per hectare) for cattle grazing, always associated with improved tropical pastures.

Microwatershed
A small geographic unit where a group of families lives, using and managing the available resources, mainly soil, water and plants.

Neotropics
A term utilized in biogeography to identify the tropical region of the American continent. This term is applied in different contexts with slightly different delimitations.

Nursery workers
People who work in plant nurseries.

Restoration Production Chain

The suite of operations that transform determined factors or supplies of goods or services through technological processes. In the case of restoration these include activities such as:

The collection of seeds, the production of seedlings, environmental evaluation and monitoring, forest restoration techniques and development, implementation, maintenance and monitoring of projects.

Silvopastoral System (SPS)

Production systems integrating cattle pasture with the presence or cultivation of trees.

Water committees

Water committees work to increase understanding of topics related to the use and sustainable management of water systems.

Watershed

The entire territory which drains into one specific natural river drainage system, which deposits the water into the ocean or into a single lake.

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