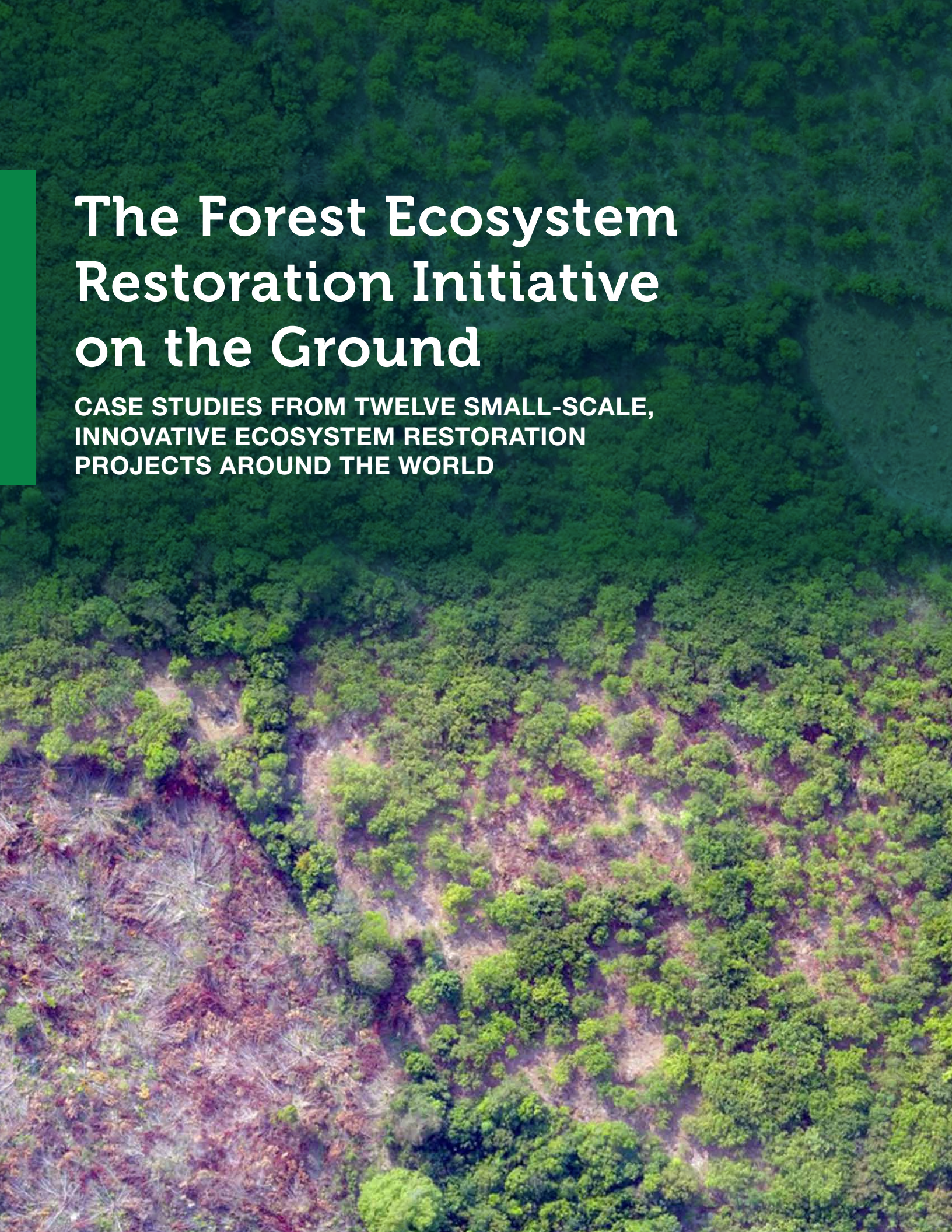
The Forest Ecosystem Restoration Initiative on the Ground

CASE STUDIES FROM TWELVE SMALL-SCALE, INNOVATIVE ECOSYSTEM RESTORATION PROJECTS AROUND THE WORLD



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CASE STUDIES FROM TWELVE SMALL-SCALE, INNOVATIVE ECOSYSTEM RESTORATION PROJECTS AROUND THE WORLD

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Convention on Biological Diversity
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Foreword

The theme of forest ecosystem restoration is highly relevant and cross-cutting to the agenda of the three Rio conventions. The degradation of ecosystems reduces habitats for many species and is a key driver of biodiversity loss. Loss of trees and vegetation contributes to climate change through reduced carbon sequestration, reduces resilience and increases the risk of desertification in terrestrial ecosystems.

Forest restoration provides a common response to these issues. It can generate employment, benefit livelihoods, provide a habitat for threatened species, sequester carbon and contribute to the adaptation to and mitigation of the effects of climate change. As many of world's forests and other ecosystems are degraded, restoration will be a crucial part of the solution to bend the curve on biodiversity loss, contributing to the post-2020 global biodiversity framework and multiple Sustainable Development Goals This is the rallying call of the United Nations Decade on Ecosystem Restoration (2021-2030), adopted by the General Assembly of the United Nations.

As restoration needs to be carried out in ways that balance social, economic and environmental objectives, and in a manner fully involving indigenous peoples and local communities and all relevant stakeholders, including women and girls, the Conference of the Parties to the Convention on Biological Diversity, in 2016, adopted a short-term action plan on ecosystem restoration as a flexible framework, adaptable to national circumstances and legislation. The Forest Ecosystem Restoration Initiative (FERI) has been supported by the Korea Forest Service of the Republic of Korea and implemented by the Secretariat of the Convention since 2015. FERI has supported the implementation of this framework by empowering developing country Parties, over the last five years, through capacity-building workshops, and provision of materials, such as publications, tools and support to the pilot restoration projects presented in this booklet.

Ecosystem restoration will certainly play a prominent role in the post-2020 global biodiversity framework to be adopted by the Conference of the Parties at its fifteenth meeting, and through an extended agreement with the Korea Forest Service, FERI will continue, through 2025, to play its role of supporting countries as they strive to achieve the goals of this new framework.

The restoration field projects presented in this booklet provide concrete examples of how countries and agencies are making progress on the ecosystem restoration agenda. It is my hope that they will inspire others towards replication and scaling up across all levels of society, so that we can accelerate our journey to achieve the 2050 Vision of "living in harmony with nature."

Elizabeth Maruma Mrema
Executive Secretary
Convention on Biological Diversity

Introduction

The Forest Ecosystem Restoration Initiative (FERI) was launched in October 2014 on the margins of the twelfth meeting of the Conference of the Parties (COP) to the Convention on Biological Diversity (CBD). Supported by the Korea Forest Service of the Republic of Korea and implemented by the CBD Secretariat, the aim of the initiative is to support ecosystem restoration activities under the Convention and to contribute to the achievement of the Aichi Biodiversity Targets, in particular Targets 5, 14 and 15[1]. The Initiative has been extended for a further five years (2021-2025) under a Memorandum of Understanding between the Korea Forest Service and the CBD Secretariat.

One of the main implementation channels of FERI is to provide strategic co-funding and technical support to pilot restoration activities in developing countries. These pilot projects test a variety of innovative restoration techniques and compile and disseminate lessons learned that could be used in similar restoration contexts. However, ecological science shows that successful restoration is a long, complex undertaking with results often measured decades later. Given their small-scale funding model and short implementation periods (on average US$ 74,000 and 12-24 months duration), these projects were not designed to attempt large-scale restoration of mature forests. Rather, they are experiments with a catalytic, replicable or scalable nature, often within the context of larger co-funded projects.

A total of 12 projects received funding from FERI. Projects incorporating biodiversity considerations were selected between 2016 and 2017 through calls for submissions through the Secretariat and the Global Partnership on Forest and Landscape Restoration (GPFLR). As a result, projects were selected spanning four continents and representing a variety of forest ecosystems. Projects selected were supported through government channels and supported alignment with national commitments, biodiversity objectives and good practices, and included community involvement and gender considerations.

The case studies presented in this booklet are not exhaustive nor purely technical in nature. Rather, they present concrete examples of what small-scale funding can accomplish on the ground, in a variety of ecological and political contexts, with partners that are best placed to conduct research or undertake related ecosystem restoration practices. The projects address different steps of restoration practice identified in the Short-Term Action Plan on Ecosystem Restoration adopted by Parties at CBD COP 13 in decision XIII/5 (included in the annex), particularly the first steps of restoration planning with a strong focus on the full and effective participation of indigenous peoples and local communities.

More information on these projects and additional resources are available on the FERI webpage, accessible from the CBD website at www.cbd.int/restoration. This includes reports of the outputs cited in this document, policy briefs for decision makers and restoration practitioners, and a guide to the steps of the STAPER with related tools and case studies.

We hope that as you browse the case studies presented in this booklet, you find inspiration in the efforts of dedicated practitioners on the ground and the catalytic potential of small-scale restoration projects.

1 The FERI is described in UNEP/CBD/COP/12/INF/19

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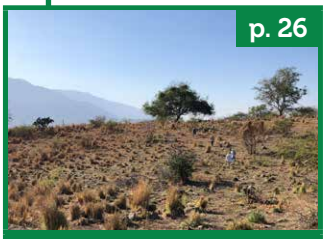
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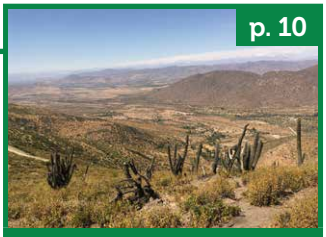
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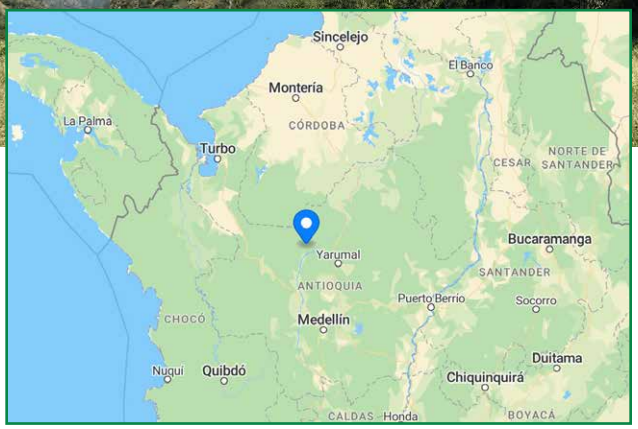


Ituango, Colombia

Establishment of pilot restoration plots in the biodiversity compensation area of a hydroelectric power plant

Quick Facts

Implementation partner: Bioversity International

Ecosystem type: Tropical dry forest

Area under direct restoration: 10 ha

Area of influence: 13,000 ha

Duration: 23 months

Relevant STAPER activities: A2, A4, C1 (see annex)

Key message

» Appropriate selection of tree species for forest ecosystem restoration is critical. A user-friendly tool for the selection of species and sourcing of materials enables the restoration process by linking scientific and market-based information.

Overview and objectives

Implemented in the biodiversity compensation area of the hydroelectric power plant of Ituango, this project aimed to improve the scant knowledge on the mechanics of restoration practice in Colombia's native tropical dry forests. The main objective was to determine the most cost-effective techniques for restoring this ecosystem by testing restoration approaches across a gradient of increasing intensity of intervention and cost. Another objective was to test a decision-support tool for selecting appropriate planting material for the restoration of tropical dry forest at any given site in Colombia.

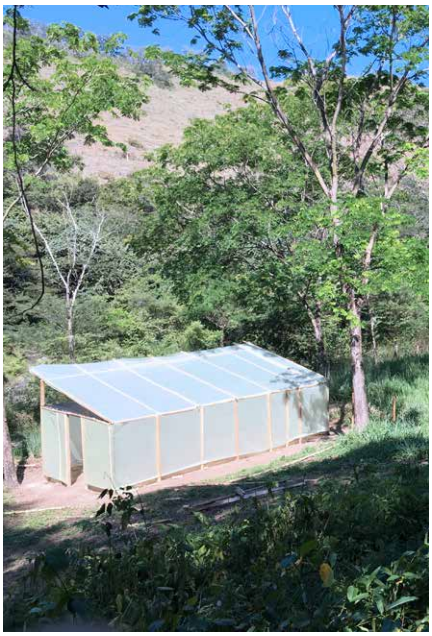
Context

Tropical dry forest is home to over 900 different tree species and is one of the most endangered ecosystems of Colombia with only 8 per cent of its original cover remaining. In 2018, the largest hydroelectric power dam project in the country was approved to be built in the biodiversity hotspot of Ituango, Colombia. The builder, Empresas Públicas de Medellín, was legally obliged to compensate for flood zones through the restoration of 13,000 hectares of degraded lands in the surrounding area. However, the original restoration plan contained too few plant species which could lead to a genetic bottleneck and risk the future survival of the restored tree populations. The project aimed to fill this gap by conducting tests to optimize climate-smart plant selection for the long-term success of the re-established vegetation.

Approach and innovative aspects

» This project aimed to test the selection of species for forest restoration made by a web-based tool (www.diversityforrestoration.org) developed by Bioversity International in a previous phase, for decision-support on the choice of species for climate-smart forest restoration. 130 experimental plots of 1000 m^2 were established across 26 hectares to test the success of a variety of restoration strategies on land showing different degrees of degradation.

» An experimental design approach of restoration pilot plots across a gradient of increasing intensity of intervention was used, varying from natural regeneration (least expensive) to the establishment of diversity nodes that concentrate native diversity (most expensive), and intermediary interventions.

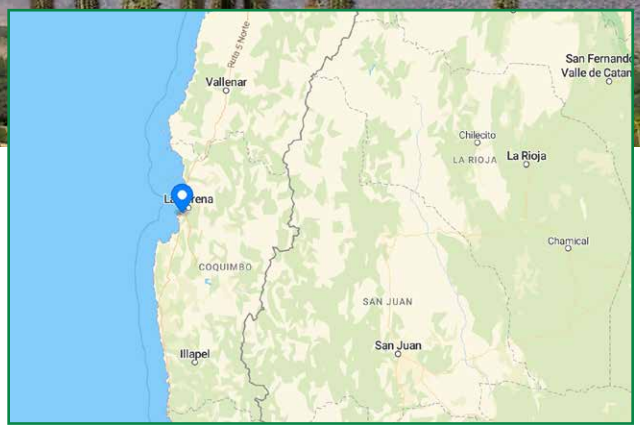

- A transitory nursery produced over 50,000 seedlings of more than 30 species selected with the DiversityForRestoration tool. Two rounds of replanting activities were carried out to replace dead seedlings and measure and tag surviving seedlings and resident plants.
- Ecological restoration of seasonally dry tropical forest can be a complex undertaking due to the scarcity of water for plant growth and survival during several months of the year. The challenge of water availability was mitigated as much as possible, for example using appropriate substrate preparation (e.g. addition of a hydro-retainer).
- These restoration interventions were developed in a participatory way with staff from Empresas Públicas de Medellín and scientists from Bioversity and the Humboldt Institute. Plots were periodically remeasured to assess the performance of planted trees and the success of natural regeneration.

Results and outcomes

- At the end of the project, two rounds of measurements had been conducted on the experimental plots and yielded preliminary results on the success of each form of restoration. Monitoring of the experimental plots will continue in the next decade with the support of Empresas Públicas de Medellín.
- Preliminary results showed that assisted natural regeneration, including weeding, pruning, thinning and the application of fertilizer, was a very efficient method of restoring severely degraded land compared to natural regeneration alone. The survival rate of replanted seedlings initially was very high regardless of prior level of degradation (90 per cent on average), but after one year mortality rates reached up to 90 per cent, depending on species and degradation state.
- Building on the former decision-support tool (www.restool.org), a global online platform to guide selection of planting material was developed: www.diversityforrestoration.org[2] which has been scaled to other geographies in South America and Africa, with further scaling underway around the world.
- *CBD Technical Series 89* outlines the methodology used in this decision-support tool. [3]
- The management of the plant nursery was handed over to the University of Colombia Medellin to ensure the continuity of replanting efforts.
- Long-term project outcomes will used as input for the methodology of the largest dry forest restoration project in the region, implemented by Empresas Públicas de Medellín to mitigate the biodiversity impacts of the planned Ituango hydropower dam over 13,000 hectares.

2 Fremout, T., *et al*. 2022. Diversity for Restoration (D4R): guiding the selection of tree species and seed sources for climate-resilient restoration of tropical forest landscapes. J. Appl. Ecol. 59, 664–679.

3 Thomas, E. *et al* (2017), The importance of species selection and seed sourcing in forest restoration for enhancing adaptive potential to climate change: Colombian tropical dry forest as a model, *in* CBD Technical series 89:122-134.



Coquimbo, Chile

Designing a model of socio-environmental investment for restoration of degraded land in semi-arid zone

Quick Facts

Implementation partner: National Forest Corporation of Chile (Corporación Nacional Forestal, CONAF)

Ecosystem type: Drylands

Area under direct restoration: 200 ha

Area of influence: 1,429,300 ha

Duration: 22 months

Relevant STAPER activities: A1, A2, A3 (see annex)

Key message

» Rainwater retention works (such as terraces, dykes, walls etc.) can restore water availability and enable regrowth of vegetation. Such interventions require long-term maintenance plans, therefore community involvement and training in the early stages of restoration projects is key to their success, as well as the consideration of socioeconomic benefits from the restored land.

Overview and objectives

This project focused on the restoration of dryland areas in Chile that were degraded due to intense wheat farming, with the aim of restoring the hydrological balance of the ecosystem through forest restoration in the watersheds. One of the main goals was to implement rainwater and soil conservation measures to allow the infiltration of water into the ground and thus prevent erosion. The restoration measures developed aimed to combat desertification, conserve biodiversity, and mitigate and adapt to climate change. The restoration of pilot sites also aimed to demonstrate the benefits of restoration to local communities and decision makers.

Context

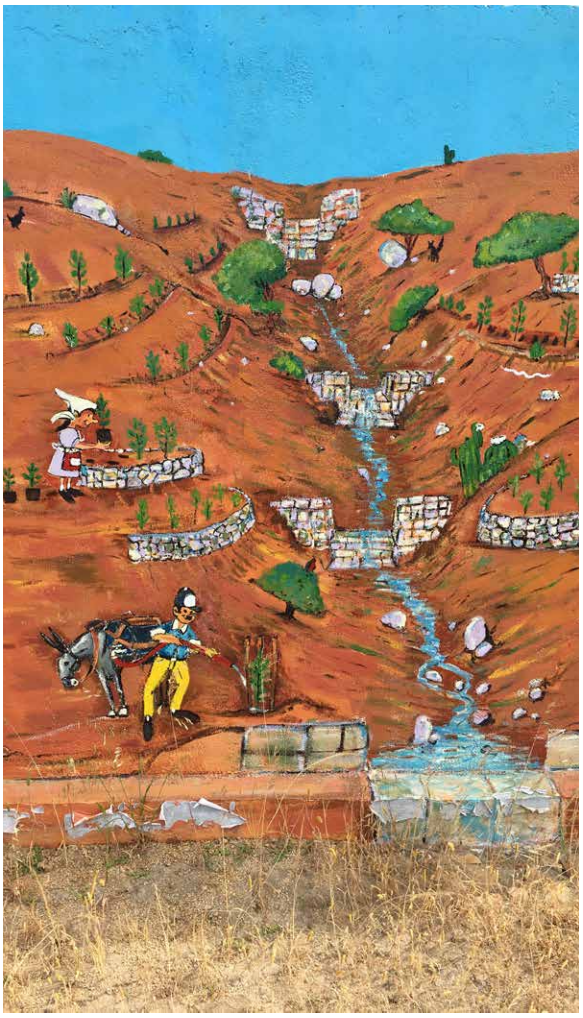
The Coquimbo Region is primarily an arid zone affected by desertification, land degradation and drought. It suffers from depleted soils due to past intensive wheat culture, especially in the Peña Blanca Agricultural community. A characteristic of arid and semi-arid areas is that rain falls irregularly and much of it is lost as surface runoff, especially on severely degraded land which is the case for this project. Torrential rainfall events are common, causing the loss of water and highly compacted soil. The Regional Development Strategy and the Rural Development Policy in the Coquimbo Region planned the ecosystem restoration measures in response to frequent demand from local communities. At the national level, the Government of Chile is committed to avoid the degradation of 100,000 hectares of native forests and xerophytic vegetation.

Approach and innovative aspects

» In addition to data collection on flora and fauna, the baseline study for restoration of the area considered social, economic and cultural factors, by ranking the environmental concerns and needs of local populations in order of priority. This helped inform the species composition for the restoration activities.

» The main activities under this project were the grazing exclusion and tree-planting on 100 hectares of common fields, and soil conservation measures on another 100 hectares.

» Plant species were selected based on their adaptive capacities to enhance water retention with



sufficient ground cover, prevent erosion through their root systems, and provide new habitat and food sources for small wildlife.

» To increase water infiltration and slow runoff, soil conservation work was conducted including infiltration trenches, diversion canals, dykes and forest terraces. Fences were built to exclude domestic animals from the area to secure the revegetation process.

» Finally, communities were trained to monitor the effects of the restoration activities which will continue with the support of UN-REDD.

Results and outcomes

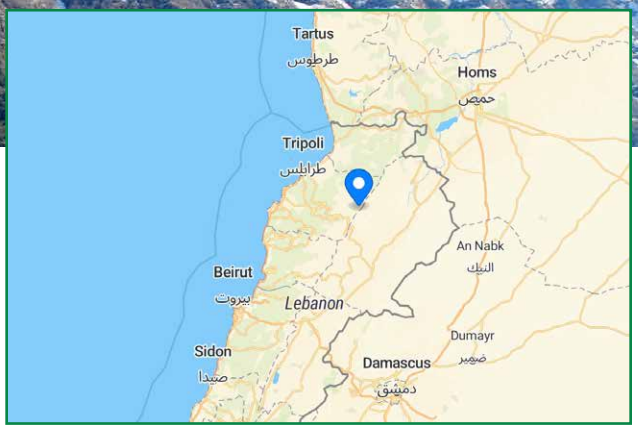
» Biodiversity and ecosystem services were successfully recovered inside the exclusion areas and wells in the communities. Some non-native species were selected for plantation; however these species are not considered invasive on slopes. CONAF selected some of these species as the best-suited to optimize erosion control and create a surface layer of organic matter..

» An information note regarding a technical tour of the project was published

» Development of a proposal to the Global Environment Facility and Green Climate Fund by CONAF and other government agencies building on the outcomes.

» Activities continue with support from the UN-REDD Programme.

» This project will allow the continued development of a model of socio-environmental investment for restoration of degraded land in semi-arid zones of Chile, under UN-REDD financing.



Mount Lebanon, Lebanon

Identifying biodiversity-related success factors of ecological restoration projects

Quick Facts

Implementation partner: Saint Joseph University

Ecosystem type: High altitude forest

Area under direct restoration: 65 ha

Duration: 26 months

Relevant STAPER activities: C1, C3, C5 (see annex)

Key message

» Forest restoration projects can derive great benefit from integrating genetic considerations from seed-dispersing wildlife in the selection of appropriate tree species and sources of forest reproductive material.

Overview and objectives

This project focused on determining biodiversity-related success factors of ecological restoration actions in the biodiversity hotspot of Mount Lebanon. One of the main objectives was to consider the role of wildlife in ecological restoration processes by studying what plant species different animals disperse, over variable time frames. The goal was to identify plant species to be used in restoration that can sustain wildlife year-round to enhance biodiversity. Given its novel character in leveraging faunal diversity in restoration, this study aims to be a cornerstone to subsequent reforestation actions in Lebanon and in the Eastern Mediterranean region.

Context

Many natural resources in Lebanon are depleted through long-term unsustainable forest use, fires and overgrazing. These processes have led to a high degree of erosion and to a decline in land productivity. Reforestation efforts since the 1960s have been hampered by a war of over 30 years. Recently, the Government of Lebanon launched the '40 million trees programme', a national initiative steered by the Ministry of Agriculture to plant 40 million trees in public lands over the next 20 years. Environmental non-governmental organizations and academia are invited to work under this project umbrella.

Approach

» The project field-tested a set of parameters affecting plant and animal biodiversity interactions in three different sites on Mount Lebanon: a globally fenced site, a site where planted trees were individually fenced, and a protected reference site.

» In these plots, two major components were tested for their effects on biodiversity: i) the effect of fencing on ecological succession and ii) the role of animal wildlife in dispersing seeds to promote the self-sustainability of the restored forest. To test the first component, the project used the reference landscape to determine natural succession stages in that ecosystem. Then, appropriate tree species for plantation were selected according to their dispersion mode and place in the succession timeline. For the second component, the presence of animal wildlife was recorded and scats analysed with a DNA meta-barcoding technique to determine species present and what they ate.

» By collecting and performing DNA analysis on scats found in a forest, it is possible to model the food web of the ecosystem and know which animal feeds on which plant during each season, leveraging their capacity for seed dispersal to assist the process of natural regeneration and identifying which planted species may, in turn, attract wildlife back to the site. The mapping of species interactions on the study sites is transferable to other regions with similar species.

Results and outcomes

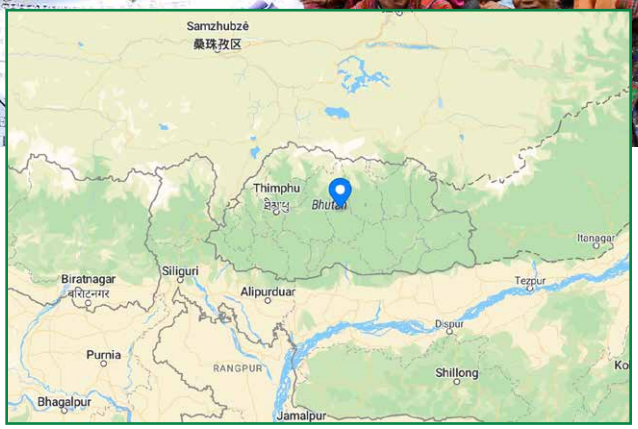
» A DNA barcode reference library for both plants and mammals in Lebanon is under construction and includes sequences for 51 plants species and 18 mammal species generated by the project.

» A policy brief on identifying biodiversity-related success factors of forest ecological restoration projects in the Mediterranean was produced to present results in an accessible format. It shows that the global fencing of sites to protect against grazing has enormous benefits for plant and animal diversity as well as soil quality. The DNA barcoding of animal scats has led to important discoveries for the selection of plant material for restoration and a better understanding of seed dispersal by animals. For example, it was discovered that wolf populations rely deeply on fruits from the Rosa family during the winter when food is scarce. The inclusion of Rosa species in future restoration projects can help maintain the life cycles of wildlife.

» An illustrated manual was published on best restoration practices in the Eastern Mediterranean region, including key recommendations for introducing plants and animals.

» The results of the study were presented at a roundtable titled “Biodiversity for resilience in the restoration of Mediterranean forests” during the 6th Mediterranean Forest Week which took place in Lebanon on 1-5 April 2019

» This study is significant as it is the first to employ a DNA dietary analysis on wildlife in the Eastern Mediterranean Region and explicitly considering the role of wildlife in ecological restoration processes. It provides reference information that is potentially relevant to all subsequent reforestation actions in Lebanon and in the Eastern Mediterranean region.



Bhutan

Restoration of Himalayan old growth oak forests through science-society interactions

Quick Facts

Implementation partner: Ugyen Wangchuck Institute for Conservation and Environmental Research (UWICER), Ministry of Environment of Bhutan

Ecosystem type: Coniferous montane forest

Area of influence: 684,916 ha

Duration: 24 months

Relevant STAPER activities: A1, A2, A3, A6 (see annex)

Key messages

» Forest restoration projects should integrate climate modelling which is critical to the viability and adaptive capacity of restored forests. This requires long-term climate monitoring and an adaptive management response to data collected.

» Community engagement promotes a better understanding of the reasons for prioritizing certain areas for restoration.

Overview and objectives

This project aimed to conserve and restore Himalayan old growth oak forests through research carried out by a government-based institute. The objective of these studies is to help understand old growth oak forest dynamics for long-term restoration and sustainable forest management, to map the extent of old growth forest distribution and to document threats. Another aim was to build the capacity of local communities to undertake restoration action and generate local income through sustainable forest-related activities.

Context

Towering above 3000 meters of altitude, Himalayan old growth oak forests are well known for the rich diversity of flora and fauna species which they support. The forests also serve as a water reservoir for downstream settlements and act as net carbon sink. In the recent past, human intervention has increased substantially resulting in rapid deterioration of these forests in the entire Himalayan range. Felling of old trees for commercial firewood and overgrazing have resulted in the complete absence of regeneration, affecting forest health and eventually leading to the drying of water sources. In this context, a main goal of the project is to inform society and policymakers on the importance of restoring and conserving these forests and how this can be accomplished.

Approach and innovative aspects

» The current distribution and extent of old growth oak forests was first mapped and GPS coordinates recorded, then future distribution of oak forests was modelled based on downscaled climate change projections for the region. The data to refine these climate projections was collected by building simple and inexpensive climate stations in strategic locations.

» The project also assessed species richness, evenness, diversity index, carbon storage and sequestration potentials and established permanent sample plots.

» Seedling shelters were installed to study and promote natural regeneration, as well as climate stations to better understand the climatic parameters of forest growth.

» Awareness campaigns were conducted for local communities on the importance of old growth oak forests, including for climate change mitigation and adaptation, and these communities actively participated in nursery management, fencing, trial layout and plantation programs.

Results and outcomes

» Old growth oak forests were mapped and an assessment of their biodiversity was conducted.

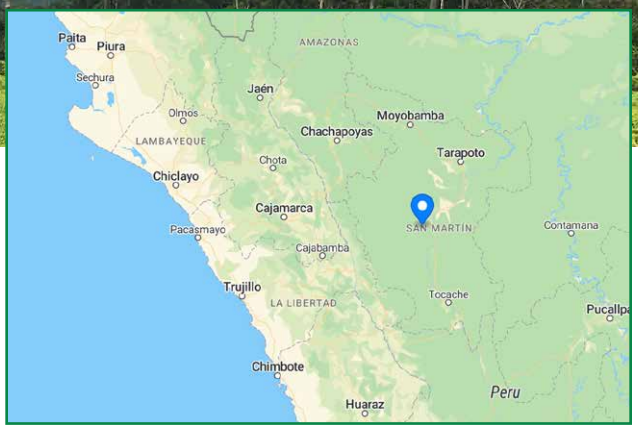
» Future distribution of oak forests was modelled based on downscaled climate change projections for the region.

» Long-term climactic factors were considered in species regeneration to "climate proof" the restoration planning. By modelling future climate projections, decision makers can understand how the distribution of the old-growth oak forest will change over time and prioritize restoration areas that will be suitable under future conditions.

» Awareness campaigns and trainings were conducted in nine villages and local community members were trained in planting, maintenance and monitoring.

» A Bhutanese student at the University of Adelaide, Australia, developed a PhD thesis on the valuation of old-growth oak forest through carbon storage potentials.

» A final project report will inform local stakeholders, forest managers and policymakers on the importance of old growth oak forests and the need to restore and conserve them.



San Martín, Peru

Scalable strategies for landscape ecological restoration: models in a buffer zone of the Cordillera Azul National Park

Quick Facts

Implementation partner: Center for Conservation, Research and Management of Natural Areas (CIMA)

Ecosystem type: Moist tropical forest

Area under direct restoration: 70 ha

Area of influence: 1435 ha

Duration: 26 months

Relevant STAPER activities: B3, B5, B10 (see annex)

Key message

Restoration projects, especially those with a conservation angle, must demonstrate socioeconomic benefits to the communities inhabiting these ecosystems, ensuring strong buy-in and long-term results.

Overview and objectives

The project aimed to establish, together with local actors, demonstration sites for ecological restoration activities in the buffer zone of the Cordillera Azul National Park, with a view to restoring connectivity in the landscape and generating examples for future scaling-up of restoration efforts. Restoration strategies were implemented for the recovery and reconnection of degraded and deforested areas and the knowledge and capacity of local farmers was strengthened to ensure ecosystem benefits in their localities. Partnerships with local communities and nearby universities were key to managing field restoration activities and developing robust training programs based on the knowledge developed.

Context

The buffer zone of the park (23K km2)has lost at least 10K ha/year over the last 20 years, driving the north-west side to become a highly fragmented area of more than 500K ha. The park itself has a zero per cent deforestation rate and harbors a REDD+ project. CIMA has a 20 year contract with the State (2008-2028), to manage the park and has been working with local populations and their authorities since 2002. CIMA has developed strategic and territorial planning processes and participatory 'Quality of Life Plans' developed with local stakeholders who wanted to restore forests for water provisioning and soil conservation.

Approach and innovative aspects

» Species to be planted were selected based on the assessment of a reference plot, then seedlings were collected from the field to be grown in two community nurseries.

» Key sites were selected to maximize the restoration of ecosystem connectivity, ecological processes and functional diversity of pollinators.

» The survival rate of replanted saplings was calculated by performing counts on 20x20m units, selected at random in 3 sites of each restoration area.

» Through participatory monitoring and camera traps, observations of key groups such as bees, mammal dispersers, or endemic birds were registered every 4 months.

» The expectations of the community for economic development through productive land uses had to be reconciled with conservation objectives in the

buffer zone of the national park. CIMA has a singular community participation method exemplified by the Acuerdos Azules or 'Blue Agreements', which are collaborative conservation agreements between CIMA and local community boards. Activities from this project are the result of fully participative planning meetings and are part of the priorities identified by local community leaders themselves as part of their 'Quality of life plans', developed under CIMA's unique model for strengthening local capacities for conservation.

» CIMA is now working hard with the regional government of San Martin to put in place a new mechanism in the forestry law to formalization land-tenure and land-use rights in order to scale-up restoration.

» At larger scales social and environmental monitoring on the ground will have to be complemented by satellite monitoring with good resolution imagery and drones.

Results and outcomes

» CIMA developed restoration models and strategies for the recovery and connectivity of approximately 500 hectares of degraded and deforested areas, in two different landscapes while strengthening the knowledge and capacity of local farmers.

» Both passive and active restoration strategies were applied to assist in regeneration of degraded areas. 39 pioneer species were identified to facilitate initial succession and 42 species for intermediate and final succession.

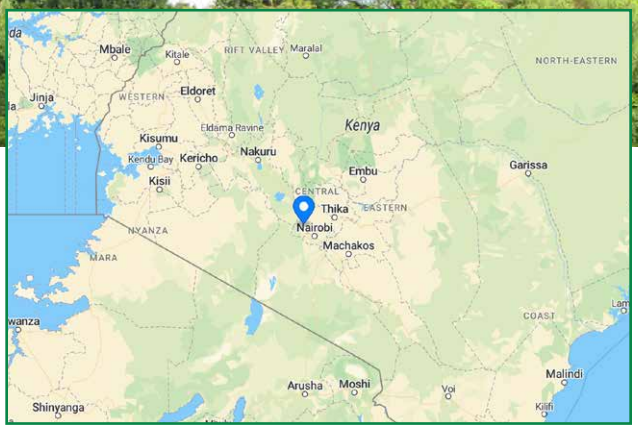
» Lessons learned from the project were converted into teaching modules to be adopted in academic curricula in local universities.

» Local communities where restoration interventions are implemented have signed agreements with CIMA to ensure the project's sustainability. A reference plot is being monitored by local undergraduate students.

» These restoration opportunities are part of national restoration programmes with a very high priority level and the initiative is aligned with the policy instruments of the San Martín region.

» With lessons learned from the project, a Regional Ordinance was generated, which declares the restoration in the region to be of interest. Scalability was demonstrated through three investment projects led by the Regional Environmental Authority.

» CIMA is currently designing a new scaled up project with an international private investor interested in livelihood improvement of local farmers, and carbon fixation.



Brackenhurst, Kenya

Ecological restoration in the sub-afromontane region of Kenya

Quick Facts

Implementation partner: Plants for Life International

Ecosystem type: Broadleaf montane forest

Area under direct restoration: 40 ha

Duration: 20 months

Relevant STAPER activities: C1, C2, C5 (see annex)

Key messages

» Achieving a mature and diverse native forest ecosystem in place of an exotic species plantation is possible over the long-term with appropriate control of invasive species.

» The quality of the species and genetic selection in the planning phase of restoration projects is a major factor for successful restoration that requires advanced local botanical knowledge and access to a reference native ecosystem.

» Scaling-up restoration using native species will require addressing the lack of local botanical knowledge among decision makers in charge of public policies on forest conservation and restoration.

Overview and objectives

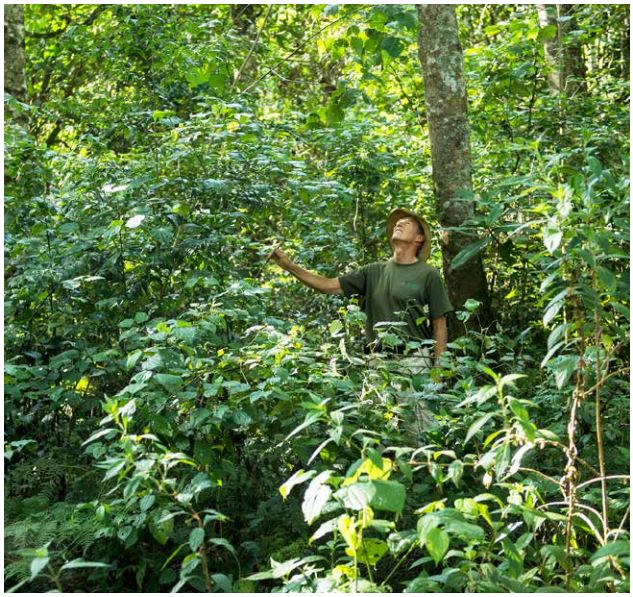
Brackenhust botanical garden, managed by Plants for Life International, aims to maintain the largest collection of cultivated native plant species in East Africa on a 40-hectare model forest. The project aimed to support Plants for Life International as a source of both restoration expertise and propagative material for other reforestation projects in the sub-afromontane region of Kenya. The project supported the replanting of new areas of forest with native trees, clearing of invasive species, and expansion onto nearby public and private land. In the long term, the objective of the project is to demonstrate to local communities in and around the site that substantial economic and social benefits can be derived from mature, diverse forests of indigenous species, without compromising their ecological integrity.

Context

Environmental degradation has occurred in Kenya where unsustainable forest use in forests such as Kinare have led to a high risk of soil erosion and desertification. High levels of air and soil pollution along with increased agricultural pressure have led to degradation of water catchment areas and water insecurity. In this national context, the model forest of Brackenhurst provides evidence of the potential and success of ecological restoration in the region. Plants for Life International is an NGO with 17 years of experience of ecological restoration and preservation of the species diversity of East African uplands. It manages Brackenhurst forest which is widely described as the finest example of restored forest in Eastern Africa with over 650 species of indigenous native trees and shrubs (50% of Kenya's total), several of which appear on the IUCN Red List.

Approach

» The project is centred around the concept of rewilding a replicable "model forest". Though relatively modest in terms of area, its purpose lies in providing decision makers the opportunity to experience first-hand the urgency of preserving primary forest ecosystems and the necessary steps for successful restoration action.



- The project began with a major drive to eradicate invasive plant species which are a great threat to satisfactory forest restoration. Collection trips to remote locations were then conducted to obtain new species, specimens and propagative material from protected and unprotected areas. Cleared areas of Brackenhurst forest were then planted with the native plant species.
- Week-long training courses were organized for non-governmental and governmental workers involved in native tree planting and reforestation in Kenya, Uganda and the United Republic of Tanzania. Communication material aimed at decision makers was developed on the compatibility of ecological restoration with development objectives.

Results and outcomes

- Restoration activities successfully expanded onto nearby government land after negotiating with various levels of local government and community authorities.
- Large areas were cleared of invasive species and were replanted, evidenced by Google Earth imagery and drone photography.
- The model forest presented increased biodiversity as a result of additional specimen collection in remote areas and successful restoration actions.
- Training sessions were organized for local NGOs and government officials. Altogether in 2018 alone, Plants for Life International has given courses and lectures to, and has led site visits for approximately 600 people.

Niger and Burkina Faso

Integrated assessment of the multiple benefits of biodiversity resulting from forest and land restoration in the Sahel region

Quick Facts

Implementation partner: AGRHYMET Regional Centre - Intergovernmental Technical Organization operating under the Permanent Interstate Committee for Drought Control in the Sahel (CJLSS)

Ecosystem type: Drylands

Area: four municipalities in Burkina Faso and Niger

Duration: 36 months

Relevant STAPER activities: A4, C1, C2 (see annex)

Key message

While short-term economic returns from forest restoration can be difficult to quantify, the recovery of degraded soils through sustainable land management practices can yield high returns and offer an alternative to deforestation for agriculture purposes. Sustainable land management must be implemented in a decentralized manner and accompanied by land tenure security, but reforms on decentralization and land tenure are progressing slowly in these two countries.

Overview and objectives

This project studied the implications of Forest Landscape Restoration (FLR) and Sustainable Land Management (SLM) interventions in different sites of Burkina Faso and Niger, in terms of carbon sequestration, biodiversity changes and socioeconomic benefits. Its aim was to inform policy development processes at the national and regional levels in regard to the benefits of a variety of FLR interventions for carbon mitigation and adaptation, as well as biodiversity conservation and sustainable use.

Context

In the Sahel region of West Africa, people depend heavily on the use of natural resources. These natural resources are subject to strong biophysical pressures: low or erratic rainfall, high temperatures, aridity, and degraded soils. In recent years, initiatives have emerged at the global level to implement FLR and SLM techniques in a more holistic way and with more resources. This research project was part of a larger project in the Sahel funded by the Food and Agriculture Organization of the United Nations (FAO) which aims to achieve the objective of land degradation neutrality in the region by 2030 by conducting FLR interventions while sustainably providing multiple social, economic and environmental goods and services. The project provided an important component to this larger project by evaluating the economic, environmental and social costs and benefits of FLR interventions.

Approach

» In the Sahel region, techniques recently labelled as FLR/SLM have been practiced for decades, such as the use of “zaï” planting pits and stone bunds to optimize water use and reduce erosion. This project quantifies these traditional knowledge techniques against socioeconomic and environmental criteria to optimize large-scale implementation.

» Analyses were conducted to quantify the biodiversity changes in soil-plant systems by developing comparative analyses at each research site between zones showing improved biodiversity conditions from FLR interventions and others that did not. Then, how these changes affected the

provision of ecosystem services at the local level were analysed.

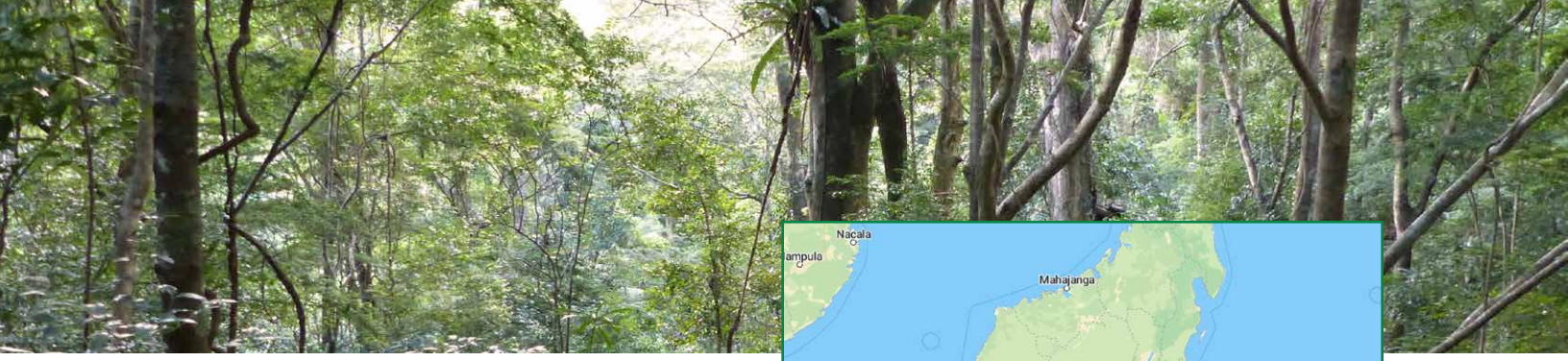
» The provision of such ecosystem services was economically valued at each research site, providing useful references for further assessment of expected benefits from scaling-up FLR intervention in comparable ecosystems.

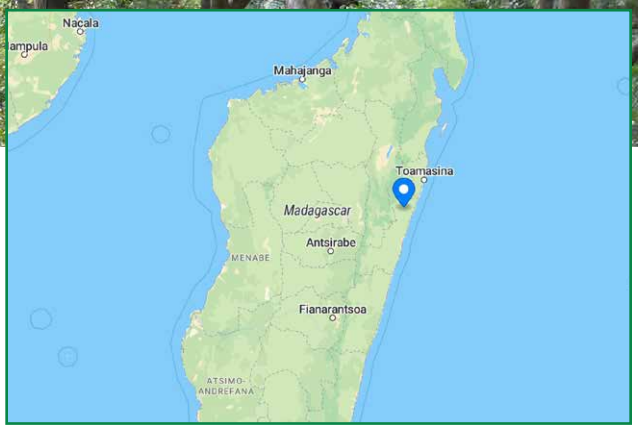
Results and outcomes

» A socioeconomic cost-benefit analysis of various FLR interventions on carbon and biodiversity was conducted in two pilot locations, providing crucial data for decision makers to choose between types of FLR intervention.

» The study produced mixed results, with economic returns of FLR declining rapidly after the first few years of activity but showing high net gains in terms of ecosystem services, increased biodiversity and ecosystem resilience. The study also showed that SLM actions to recover degraded soils for permanent farming is very profitable, a fact that could interest agro-investors who tend to seek out and exploit the most fertile land in the region.

» A policy brief on the effectiveness of land restoration in the Sahel was co-authored by a professor from the University of Brest and the two post-doctoral students who conducted the field studies for the project.





Atsinanana, Madagascar

Restoration initiatives of degraded humid forests in the World Heritage site 'Rainforests of the Atsinanana'

Quick Facts

Implementation partner: Madagascar National Parks

Ecosystem type: Moist tropical forest

Area restored: 180+ha

Area influenced by restoration: 47 741 ha

Duration: 30 months

Relevant STAPER activities: A2, A3, B3

Key message

Indigenous peoples and local communities' unique knowledge of the terrain to promote best techniques for planting and growing seedlings is key to the success of restoration.

Overview and objectives

In collaboration with local communities, the project, which is ongoing, aims to assess the state of degradation and start pilot restoration activities in three national parks that are part of the UNESCO World Heritage Site 'Rainforests of the Atsinanana'. The objective of these trials is to improve the efficiency of restoration in the ecoregion by identifying interventions that maximize impact of and minimize costs in different contexts. The results of these activities will contribute to the development of a restoration guide for humid forests in protected areas and inform the national targets in the National Biodiversity Strategy and Action Plan 2015-2025, the Nationally Determined Contribution, the AFR100 and the Bonn Challenge to restore 4 million ha by 2030.

Context

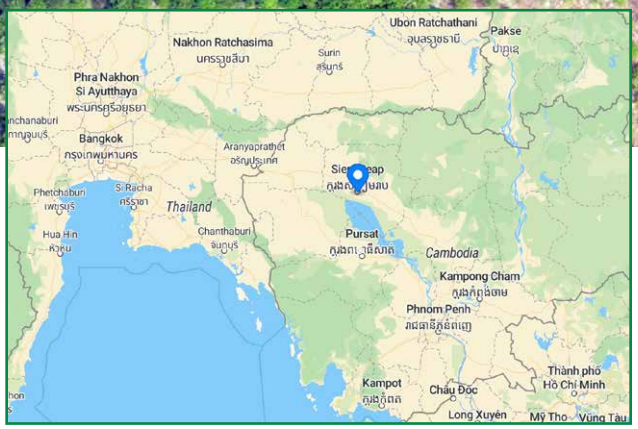
The Rainforests of the Atsinanana are one of the most important and representative habitats of Madagascar humid forests with exceptional levels of biodiversity and many endemic species. The National Parks in this region are recognized for the importance of their ecosystem services, especially their phenomenal carbon sink capacity. These rainforests are currently placed on the World Heritage in Danger list and restoration activities under this project respond to the corrective measures requested by the World Heritage Center. These activities are therefore of paramount importance in the protection of habitats and species.

Approach

- A preliminary study was conducted to map priority areas of natural habitat loss through a baseline assessment of degradation. Local communities were trained in restoration interventions.
- Pilot natural regeneration interventions will be carried out in three national parks of the World Heritage Site in accordance with recommendations of the preliminary study.
- The project reported on pilot activities, with conclusions on the benefits to local communities and recommendations for the future planning of restoration activities in the World Heritage site and the wider eastern rainforest ecoregion.
- The project is a flagship example of successful partnership between a formal organization (Madagascar National Parks) and organizations of forest-dependent people, in the design and preliminary assessment of restoration opportunities.

Results and outcomes

- A preliminary study was conducted, including a baseline assessment of degradation, map of priority areas and recommendations of appropriate pilot interventions.
- Agreements were signed with local communities living in or near the national parks, and field training schools were conducted to teach effective skills to grow seedlings in nurseries and remove invasive species.
- Pilot restoration interventions were conducted through the hiring of local workers.
- A report was published on the success of pilot activities, with conclusions on the benefits to local communities and recommendations for the future planning of restoration activities in the World Heritage site and the entire humid forest ecoregion;
- The restored plots are integrated into the ecological monitoring system of Madagascar National Parks.



Siem Reap, Cambodia

Restoration of ecosystem services in Phnom Kulen National Park

Implementation partner: General Directorate of Administration for Nature Conservation and Protection of the Ministry of Environment of Cambodia

Ecosystem type: Evergreen and deciduous forest

Duration: 18 months

Relevant STAPER activities: A2, A6, B4

Key message

The institutional framework for biodiversity conservation and restoration must incorporate religious, cultural and socioeconomic variables. The resilience of forest-dependent populations depends on their needs being met in the planning and zoning process.

Overview and objectives

This project aimed to assess opportunities for ecosystem restoration and associated financing mechanisms in Phnom Kulen National Park, a 374 km^2 park in northwest Cambodia that holds incredible cultural and biodiversity value. Restoring and protecting the park goes hand-in-hand with improving the sustainability of production to reduce the risk of increased forest degradation. The objective was also to protect archaeological sites as well as and the streams that provide water to the Temples of Angkor and Siem Reap town. The project also aimed to disseminate tools for monitoring the long-term implementation of forest and landscape restoration and build local and national capacity to use them.

Context

Phnom Kulen National Park is Cambodia's most sacred mountain and is of immense spiritual, cultural and historical value. As one of the few remaining evergreen forest areas in northern Cambodia, it contains 25 per cent of Cambodia's plant species listed as threatened on the IUCN Red List. Biodiversity surveys have identified 28 IUCN-listed species of global international concern within the park, including significant bat species density. Alarmingly, the park has lost 31 per cent of its forest cover between 2006 and 2016. Phnom Kulen National Park is also an important watershed as it represents a significant part of the upper catchment of the Tonle Sap Great Lake. Restoration and improved protection of habitats in the upper catchment would significantly enhance the functional diversity of the landscape to support the delivery of water services as well as provide improved connectivity among several wildlife sanctuaries. The COVID-19 crisis dramatically increased the vulnerability of forest-dependent communities in terms of health, food security and safety risks, and loss of income from tourism activities. This poses a heightened threat to the environment in the park as unsustainable practices become necessary for survival. To address the growing threats, many relevant agencies and NGOs accelerated disbursement for tree plantation and monitoring activities by local communities, including FERI.

Approach and innovative aspects

» The project mapped and demarcated variables such as cultural heritage sites, biodiversity hotspots, forest cover, water bodies and land use practices in and around the Phnom Kulen National Park.

» A baseline assessment of biodiversity on the site was conducted using data from existing studies. This was followed by the analysis, identification and prioritization of the areas within the park for different types of designations such as absolute

protection, restoration, or community use for sustainable livelihood.

» Potential resettlement sites for cashew nut farmers were identified in the buffer zone of the National Park. A second phase of this project, underway in 2021, offers local populations to be hired to implement forest landscape restoration activities on the site.

» This project addressed the drivers of ecosystem degradation in the park, which included damaging agricultural practices (e.g. slash and burn) and the illegal but widely spread monoculture of cashew nut. The identification of potential resettlement sites for cashew nut farming and a cash-for-works scheme for forest and landscape restoration are solutions presented to provide livelihoods for forest dependent communities, prevent further degradation and ensure the permanence of restoration actions.

Results and outcomes

(consult the FERI webpage at www.cbd.int/restoration for more details)

» Maps and a GIS database were created to demarcate cultural heritage, biodiversity, forest cover, water bodies, biodiversity hotspots, land use practices and degraded sites.

» Based on a field assessment and participatory consultation with local stakeholders, management zones were proposed under the Protected Area Law of 2008: core zone, conservation zone, multiple use zone, and community use zone. This report will contribute to develop the park's zoning for its future sustainable management.

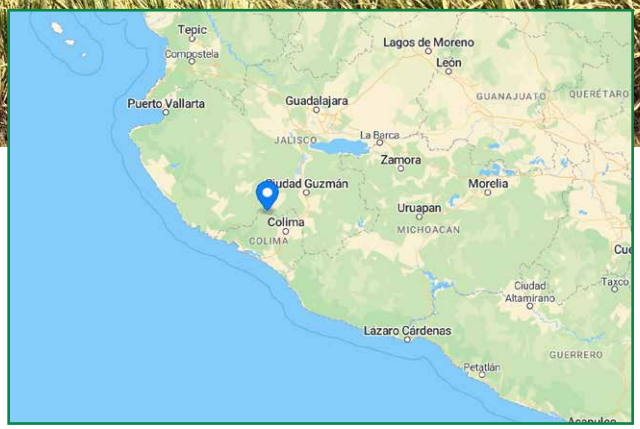
» A report on the assessment of restoration opportunities recommends that restoration sites be focused around degraded headwater catchment areas, especially those at higher elevation and steeper slopes (at increased risk for erosion), and areas subject to land encroachment by illegal agricultural activities.

» A map was created of existing public and private initiatives and institutions, policies, management activities, and financial and non-financial incentives, to support the management of restoration activities implemented in the park.

» 50 inhabitants of community protected areas were hired to implement forest and landscape restoration activities.

More information

https://www.feri-biodiversity.org/cambodia



Jalisco, Mexico

Conservation of key species and restoration of ecosystems in the Nevado de Colima Manantlán El Corcovado corridor through social participation

Quick Facts

Implementation partner: Reforestamos México

Ecosystem type: subtropical montane and temperate forests

Duration: 22 months

Relevant STAPER activities: B2, B4, B9

Key message

The conservation of certain species that require large areas for feeding and breeding is highly dependent on efforts to restore connectivity over the entire range of their habitat. It is possible to combine these efforts with human activity, by developing agroecological techniques that take into account the needs of these species.

Overview and objectives

Over an area of 367,000 ha between the Mexican states of Jalisco and Colima, this ongoing project aims to maintain and restore a functional biological corridor between three protected areas. The wide diversity of ecosystems in this area provides habitats for key endangered species, including the jaguar and green macaw. The project will identify sites under greatest anthropogenic pressure and facilitate the legal designation of some project areas that are not currently under protection as 'inter-municipal protected areas' or voluntary area for conservation. The project is carried out by Reforestamos México, a prominent civil society organization on restoration in Mexico.

Context

The Nevado de Colima National Park, with its two volcanoes, and the UNESCO Biosphere Reserve Sierra de Manantlán sit on the border of Jalisco and Colima states. The project area hosts 75 nationally protected species including over a dozen endemic species, and its ecosystems provide water to over 1.5 million people in the surrounding region. In addition to Nevado de Colima National Park and the Sierra de Manantlán Biosphere Reserve, the study region includes the Protected National Area of Mesófilos State Forests, as well as Cerro Narigón, Presa Las Piedras and El Corcovado, which have no conservation category but are sites of great biological wealth. This is a challenge for connectivity as there is very little monitoring of agricultural activity in these zones. Unsustainable production activities such as land use change for agriculture and livestock purposes, cause damage to the environment, and need to be addressed urgently.

Approach

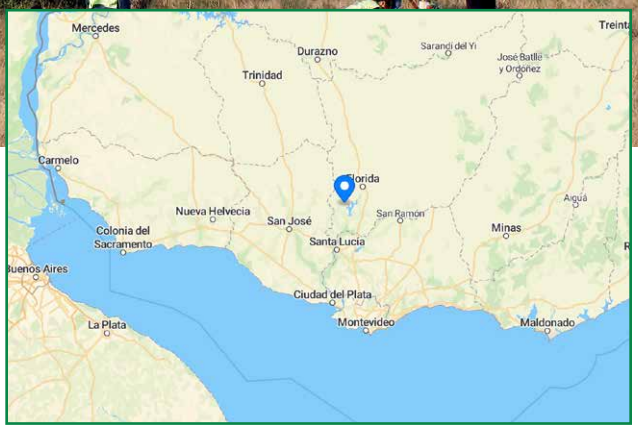
» Degraded sites were mapped, and activities that cause fragmentation identified. Agroforestry projects were implemented on 5 pilot farms using a replicable model and considering capacity-building for organized groups.

» An environmental monitoring program was developed in the Nevado de Colima –Manantlán corridor for key species (jaguar and green macaws) involving 10 community committees. Monitoring partners received a 20-hour training accreditation and necessary equipment.

- Development of a community seed bank and process of indexation for sustainable products of regional importance continue.
- A report on the baseline for restoration will be compiled to support the adoption of a decree creating the inter-municipal protected areas of Cerro Narigón-Las Piedras Dam and El Corcovado.

Results and outcomes

- Productive restoration is being completed in five pilot sites identified in a priority area of the biological corridor, directly impacting 55 hectares under restoration through social participation actions.
- This project is based on a "productive restoration model", featuring pilot farms that incorporate ecological practices into agriculture to allow the recovery of degraded areas. This replicable model has garnered high interest from the farming community in the area for both the economic benefits of improving land use, and to maintain historical levels of biodiversity that hold cultural value. More than a dozen producers committed to conserving the environment and monitoring species collaborated on the project.
- The presence of green macaws, jaguars, ocelots, puma and ungulates such as white-tailed deer and collared peccary have been identified in the areas under restoration and in the greater corridor.
- Institutions at various levels were actively involved, such as the National Commission for Protected Areas, the University de Guadalajara and the *Junta Intermunicipal de Medio Ambiente para la Gestión Integral de la Cuenca Baja del Río Ayuquila*. This can support investments in the medium term and strengthen the pilot processes implemented.
- The Nevado-Manantlán Corridor has been recognized by different institutions as a site of high value to protect and conserve ecosystems through social participation schemes and has been recognized as a proprietary site for the Biocultural Corridor of Western Mexico.



Santa Lucia, Uruguay

Restoration of the riparian vegetation of Paso Severino's reservoir

Quick Facts

Implementation partner: Ministry of Housing, Spatial Planning and Environment of Uruguay

Ecosystem type: Riparian temperate forest

Area under direct restoration: 160 ha

Duration: 16 months

Relevant STAPER activities: C2, C3, C4

Key message

For riparian forests to act as an efficient regulator of water quality against nutrient and chemical runoff from agriculture, it is essential to also incorporate good agricultural practices to reduce the runoff at the source. The accumulated riparian vegetation also needs to be carefully managed to avoid counteracting the positive aspects of the buffer zone with possible negative effects on the supply of nutrients.

Overview and objectives

Coordinated between the government and local community, this project aimed to restore the riparian forest and vegetation on the edge of the Paso Severino reservoir. This vegetation acts an important regulator for the water quality in the reservoir by reducing the nutrient and chemical runoff from adjacent productive lands (i.e. dairy farms, livestock and agriculture). Other objectives were to strengthen ties with the local community and to allow for systematization of lessons learned to facilitate new initiatives for restoration of ecosystems and protection of biodiversity at the national level.

Background context

The Santa Lucía River basin supplies over half of the population of Uruguay with drinking water. In response to the impact of the recent intensification of productive activities that compromise water quality for downstream communities, the Ministry of Housing, Spatial Planning and Environment developed a "Plan for the Protection of Environmental Quality and Availability of Drinking Water Sources" including actions for the conservation and restoration of biodiversity in the basin, in particular native forest. In this context, the Ministry is implementing a project for the restoration of the riparian vegetation in Paso Severino's artificial reservoir, the largest drinking water reservoir in the basin (around 2000 hectares).

Approach and innovative aspects

» Nine pilot restoration sites were established along 16 km of the reservoir's edge, covering an area of approximately 160 ha. In these sites, about 1,500 native trees were planted, whose seeds were obtained from the Santa Lucía river basin by different techniques.

» Pilot sites were also fenced off against cattle and a weekly maintenance programme was implemented with local stakeholder participation (i.e. watering, cattle exclusion wire maintenance, reposition of stakes, etc.)

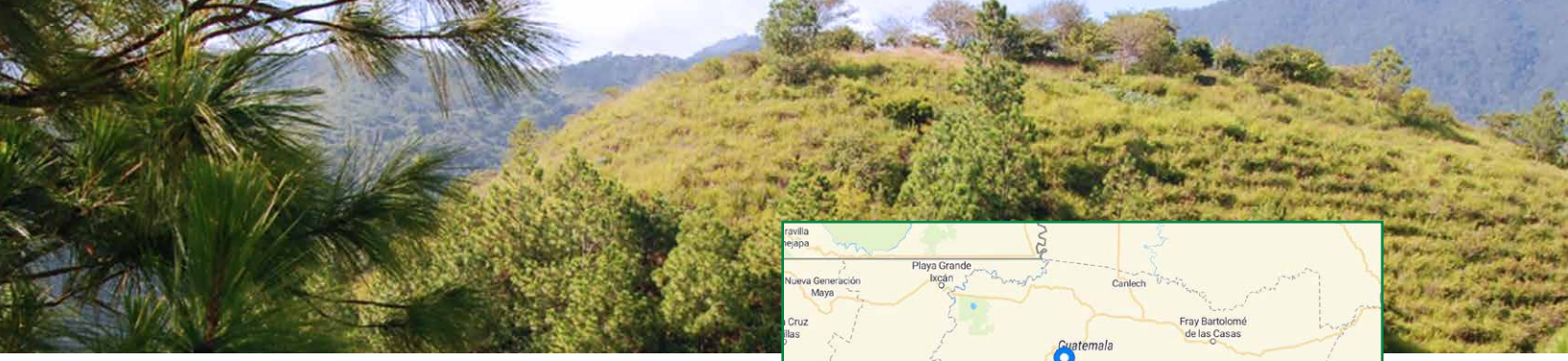
» Workshops and communication activities for the local community were organized, including awareness campaigns in schools.

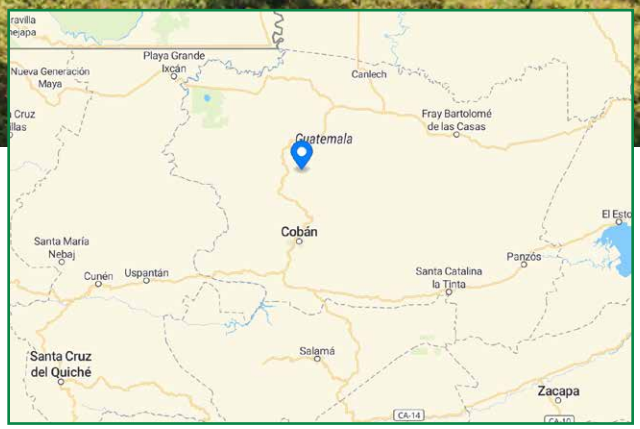
» A study - the first of its kind in Uruguay - was developed to evaluate the nutrient retention capacity

(specifically of phosphorus and nitrogen) in areas with native vegetation.

Results and outcomes

- Plantation activities in the project area have doubled, with newly planted areas covering almost half of the degraded reservoir's edge and survival levels very high.
- Saplings were continuously monitored and their survival rate reached nearly 95 per cent. Work has begun to systematize the experience of Paso Severino with the aim of compiling the lessons learned into a manual.
- The project studied a very specific type of ecosystem service: the ability of riparian forests to act as a natural buffer zone to protect water reservoirs from nutrient and chemical pollution from nearby agricultural activities.
- Despite scarcity of field data and some logistical difficulties, the study concluded that the maintenance or restoration of buffer zones to reduce the nutrient runoff from agricultural soils into nearby water represents enormous potential as a management measure.
- Capacities of the local community were expanded through a national awareness campaign on the role of riparian forest, the participation of 125 people in restoration activities on site and the training of over 200 participants in field workshops.
- Three members of a locally run nursery were trained to grow the seedlings and monitored the plantation in Paso Severino with the support of the government team according to a monitoring protocol generated for that purpose, and the results were reported.





Guatemala

Development of a forest landscape restoration programme for Guatemala based on ITTO guidelines

Quick Facts

Implementation partner: International Tropical Timber Organization (ITTO)

Ecosystem type: 4 strategic forest ecosystems - cloud forests, dry forests, pine-oak forests and mangrove forests

Area under direct restoration: 200 ha

Duration: 36 months

Relevant STAPER activities: A2, A3, C3 (in annex)

Key message

A good understanding of the current and potential value of degraded forests and their important role in the rural landscape and in rural livelihoods is a crucial prerequisite to designing and implementing successful restoration plans at the national level.

Overview and objectives

Implemented by the International Timber Trade Organization (ITTO) in collaboration with the National Forest Institute of Guatemala (INAB), this project consists of applying the "ITTO Guidelines for the Restoration, Management and Rehabilitation of Degraded and Secondary Tropical Forests" in Guatemala to reduce degradation and improve the restoration of forest ecosystems. The project aims to implement forest landscape restoration actions through pilot restoration sites established in accordance with the Guidelines, focused on four strategic forest ecosystems: cloud forests, dry forests, pine-oak forests and mangrove forests. It also aims to strengthen technical capacities in the areas related to restoration, knowledge management for restoration, and the establishment of pilot sites, to disseminate the results at the national level.

Context

Guatemala's forest cover accounts accounted for 34 per cent of the national territory in 2012. Due to strong pressure from the expanding agricultural frontier, logging and other factors, the forest cover is decreasing significantly. Over the last two decades, Guatemala has promoted policy instruments for forest conservation, management and reforestation through the Forest Incentives Programme (PINFOR) and the Forest Incentives Programme for Small Forestry and Agroforestry Landholders (PINPEP), developing regulatory, technical and planning tools to facilitate their implementation. However, despite the progress made in the administration and sustainable use of forest resources in the country, these policy instruments have yet to foster forest ecosystem restoration.

Approach

» The ITTO guidelines for the restoration, management and rehabilitation of degraded and secondary tropical forests[4] lay out a framework of 49 principles and 160 recommended actions to achieve successful forest restoration. The first principle recognizes that degraded and secondary forests are an integral part of land-use systems and hold value for some users. This project considers this fact as it involved a wide variety of stakeholders to define the goals of restoration on the pilot sites.

» A first phase of the project established locations for pilot restoration sites through geospatial analysis

4 Available at https://portals.iucn.org/library/sites/library/files/documents/2002-063.pdf

for the prioritization of pilot restoration areas in cloud forest ecosystems and pine oak forests, and the generation of maps of location of threats, coverage and current land usage.

» Agreements with local actors were developed to implement restoration activities on the pilot sites. The plan for restoration processes, follow-up, monitoring and evaluation was developed with multiple stakeholders, including local government, community representatives, property owners, academia and civil society organizations. The next step was to develop technical guidelines for the implementation of forest landscape restoration in priority forest ecosystems and, finally, to develop a national communication plan on forest restoration.

Results and outcomes

» A total of 200 hectares are currently under restoration (as opposed to 60 hectares initially planned), allowing the development of techniques for the implementation of restoration processes at the landscape level.

» Contribution to the publication of the Guatemala Forest Journal (Revista Forestal de Guatemala).

» The participation of local actors is an integral part of this project and several protocols and other local cooperation agreements were institutionalized and signed. The participation of local actors in the process has also allowed for the incorporation of local knowledge and increased project sustainability.

» A national course on landscape restoration and exchange of experiences was successfully conducted with the support of at least 10 organizations and has raised the capacity of participants from all regions of the country.

» Through partnerships with various universities, the national research agenda on forest landscape restoration was prioritized. Research projects were conducted by students of the Central National School of Agriculture as well as students from the colleges of Agronomy, Biology and Forest Engineering of the University of San Carlos de Guatemala and the Rafael Landivar University.

» The results generated by this project contribute to the achievement some of the goals of the National Landscape Restoration Strategy, however, these actions need to be maintained to promote the recovery of the country's most vulnerable ecosystems.

ANNEX
Short Term Action Plan on Ecosystem Restoration

The Short-Term Action Plan on Ecosystem Restoration (STAPER) was adopted at CBD COP 13 in decision XIII/5[5]. It is based on four main groups of activities and 24 steps. The activities listed in the Plan operate as "a menu of options, and can be implemented by countries and governmental bodies, in collaboration with international, national and local organizations, and in accordance with national legislation, circumstances and priorities." A shortened version of the activities is included below.

A. Assessment of Opportunities for Ecosystem Restoration

To ensure that restoration activities are implemented in areas requiring restoration and that are high priority taking into account ecological, economic, social and institutional realities, it is useful to implement broad-scale ecosystem assessments, including mapping, or to make use of existing assessments. These assessments can be undertaken at various levels according to national circumstances and adjusted in the light of more detailed assessments that result from the site-level activities in step C.

1. Assess the extent, type, degree and location of degraded ecosystems
2. Identify and prioritize geographical areas where restoration would contribute most significantly to achieving national level targets contributing to the Aichi Biodiversity Targets
3. Involve indigenous peoples and local communities and relevant stakeholders.
4. Assess the potential costs and multiple benefits of ecosystem restoration at relevant scales.
5. Assess the relevant institutional, policy, and legal frameworks and identify financial and technical resources,
6. Identify options to reduce or eliminate the drivers of the loss of biodiversity and the degradation of ecosystems at various scales.

B. Improving the Institutional Enabling Environment for Ecosystem Restoration

In order to facilitate the implementation of ecosystem restoration actions, the further development of the enabling institutional framework for ecosystem restoration should be considered. This includes providing legal, economic and social incentives, and appropriate planning mechanisms, and fostering cross-sectoral collaboration, to promote restoration and for reducing ecosystem degradation. This work may be informed by the assessments undertaken in step A, and, especially A5, and could be undertaken in parallel with the planning and implementation activities undertaken in step C.

1. Review, improve or establish legal, policy and financial frameworks for the restoration of ecosystems.

5 For the full text see CBD decision XIII/5 at https://www.cbd.int/doc/decisions/cop-13/cop-13-dec-05-en.doc

2. Review, improve or establish a legal and policy framework for land tenure,
3. Promote and strengthen formal and informal education systems
4. Review, improve or establish terrestrial and marine spatial planning processes
5. Consider the need for safeguard measures
6. Review, improve or establish targets, policies and strategies for ecosystem restoration.
7. Develop accounting processes
8. Promote economic and financial incentives
9. Develop plans for resource mobilization.
10. Promote and support capacity-building and training and technology transfer

C. Planning and Implementation of Ecosystem Restoration Activities

Restoration activities should be planned on the basis of priorities identified in step A and implementation facilitated by actions in step B. Actions would benefit from consultation with stakeholders and experts from various disciplines to assist with all phases of project work (assessment, planning, implementation, monitoring and reporting). Capacity-building for stakeholders, including legal and legislative support for the rights of women and indigenous peoples and local communities, may be required. The following actions may be considered, and undertaken as appropriate:

1. Identify the most appropriate measures for conducting ecosystem restoration
2. Consider how ecosystem restoration activities can support the ecological and economic sustainability of agriculture and other production activities
3. Develop ecosystem restoration plans with clear and measurable objectives and goals
4. Develop explicit implementation tasks, schedules, and budgets.
5. Implement the measures

D. Monitoring, evaluation, feedback and disseminating results

Monitoring activities should begin during the earliest phases of project development to enable ecosystem conditions and socioeconomic effects to be measured against a reference model. Effective monitoring may include extensive planning prior to initiation of restoration activities, including establishing baselines, using biological indicators, and setting clear and measurable restoration objectives based on these indicators. Remote sensing may also be a cost-effective monitoring technique in some ecosystems that can easily be repeated. Monitoring results and the lessons learned on the outcomes of activities in steps B and C may be documented, analysed and used to support adaptive management.

1. Assess the efficacy and effects of implementing the ecosystem restoration plan,
2. Adjust plans, expectations, procedures, and monitoring through adaptive management
3. Share lessons learned from planning, financing, implementing and monitoring ecosystem restoration plans

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