PRIVATE INSTITUTE FOR CLIMATE CHANGE RESEARCH–ICC-
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STUDY NAME
“Progress Evaluation in Forest Landscape Restoration Implementation: Guatemala”

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PART I
Progress Evaluation in Forest Landscape Restoration Implementation: Guatemala

1. INTRODUCTION

Guatemala is located in Central America (figure 1) with a total area of 108,889 km², limited to the west and north by Mexico, to the west by Belize and the Gulf of Honduras, to the southeast by Honduras and El Salvador, and to the south by the Pacific Ocean. The country is divided in 22 departments (Figure 2) and 340 municipalities. Its capital is Guatemala City (ONU, 2019). The landscape chosen for this snapshot analysis lies in the department called Chimaltenango located in the central highlands (see Figure 2), where most of the following information is focused on.

According to the National Population Registry, RENAP, in 2018, the population in Guatemala was 17,154,812 (17 million) (National Census 2017-18). It ranks 133 out of 187 nations in the world by its Human Development Index (HDI), last in Central America and last among Latin American countries with an index of 0.581, with a life expectancy of 71 years (PNUD, 2019). The official language is Spanish but there are also 21 Mayan languages, another indigenous one called Xinca and an Afro-Caribbean one called Garifuna (ONU, 2019). In Chimaltenango, and particularly the ten counties (municipios) that are part of the studied landscape the vast majority of the population is indigenous of the Maya-Kaqchikel group.

Guatemala had an internal armed conflict that lasted 36 years (1960 to 1996); this situation had an impact on the means of agricultural production and forest dynamics. In 1996, peace agreements were signed between the government and the guerrillas. These agreements were signed with the aim of addressing the country’s main challenges, such as: socioeconomic reforms, policies related to indigenous rights, as well as a new positive stage in the management and conservation of natural resources. A new Forestry Law was

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approved (Forestry Law, Decree 101-96) the same year as the signing of the Peace Agreement (PNUD, 2019)\(^4\).

The department of Chimaltenango is located in the central-western part of Guatemala. Its capital is the city of Chimaltenango, 54 kilometres west of Guatemala City. It has an approximate area of 1,979 km\(^2\), which constitutes 1.8% of the country, it is located at an average altitude of 1,800 MASL and the official languages of are Spanish and the Mayan language Kaqchikel.

Chimaltenango is composed of 16 municipalities, 78% of the population is Mayan Kaqchikel and 49% of the department’s population lives in rural areas. 51% of the population are women and 49% are men. The Department reports an illiteracy rate of 10.3% considering a population of 15 years and above (MINECO, 2019)\(^5\).

The location of the department on the central mountain range of Guatemala or highlands gives it a singular topography (figure 3), with high slopes in mountains, volcanoes, and ravines, and some plains (plateaus) used largely for agriculture and human settlements. The Acatenango and Fuego volcanoes are located to the southeast of the department, at the border with the departments of Sacatepéquez and Escuintla. The Fuego volcano is one of the three most active volcanoes in Guatemala. The main rivers are the Coyolate and the Madre Vieja, which drain south to the Pacific Ocean, and the Pixcayá and the Rio Grande or Motagua, north of the department, which drain to the Atlantic Ocean. Because of its topography, the climate is diverse, but mostly with a temperate climate and a dry and rainy season (November-April and May-October)\(^6\).

Despite being a mountainous department, three topographic zones can be found. The first zone is formed by lowlands to the north in the Motagua river basin, linked to the Pixcayá River. The altitude range here is an average of 650 MASL contrasting with the other plant communities found in the department, since the vegetation in this zone is representative of semi-arid regions. The second intermediate and more extensive zone is located at an average altitude of 2,000 MASL; the predominant vegetation here includes several species of pines (\textit{Pinus} spp.), oak trees (\textit{Quercus} spp.), cypress (\textit{Cupressus lusitanica}) and alders (\textit{Alnus} spp.), of Nearctic origin. The third zone is the southern part of the department in the Pacific slopes with different types of forests resulting from microclimates along an altitudinal gradient that goes from 600 MASL to 3,900 MASL (\textbf{CITE}).

2. LAND COVER/USE AND LAND COVER/USE CHANGE (HISTORICAL OVERVIEW, CURRENT LAND USE, CAUSES OF DEGRADATION)

Guatemala has had human presence for thousands of years with agriculture as the main livelihood. Corn and beans have been the main staple foods throughout history and they require direct sunlight, which implies that forests have been removed in order to cultivate them. Although there are no complete maps

\(^6\) Diccionario Geográfico de Guatemala, TOMO I, pagina 695.
that show land cover and land use in pre-colonial times, the presence of human settlements in numerous locations of the country would suggest that there was a combination of forest fragments and cropland around them. The Chimaltenango area would be a place like that because there were settlements through the different Maya periods up to the conquest, when the Maya-Kackchiquel people were colonised. In fact, the first capital of Guatemala was founded in Tecpán-Guatemala, in the Chimaltenango area (CITE). That probably meant there has been pressure on forests for centuries, growing in relation to population growth as demand for timber and firewood has been high to date (CITE IARNA STUDY ON FIREWOOD IN CHIMALTENANGO).

Subsistence agriculture is the main livelihood for most families in Guatemala, particularly in the rural areas. The production of staple crops (corn, beans, rice and sorghum), vegetables and fruits covers more than 3 million hectares distributed in 65.2% of the country, in soils suitable for natural forest management, forestry, agroforestry and non-arable agricultural crops (PNUD, 2016). Productivity of this land is diminished by inadequate soil and conservation practices, which leads to greater erosion and loss of nutrients.

In 2016, Guatemala had 3,574,244 hectares of forests according to official sources (INAB et al, 2019)\(^7\), which account to 33% of the country’s land area. Forest cover losses up to that year continued to be higher in the period 2010-2016 (680,556 hectares), than forest cover gains (579,025 hectares). Therefore, there was a negative net change. Nevertheless, annual deforestation rates have shown a downward trend: 1.43% in the period 1991-2001; 1.16% between 2001 and 2006; 1% between 2006 and 2010, and 0.50% in the period 2010-2016. Regarding the forest cover within the Guatemalan Protected Areas System (SIGAP), it was determined that of the total forest cover for the year 2016, 52.7% was within the SIGAP (INAB et al., 2019)\(^8\).

In the case of Chimaltenango, in 2010 it had a forest cover of 61,323 hectares, while for the year 2016 the forest cover increased to 68,622 hectares. During the period 2010-2016, there was a loss of 12,488 hectares of forest and 19,787 hectares were recovered, hence a net gain of 7,299 hectares of forest was reported. The net forest gain represents 11.90 % of the forest that existed in 2010. The rate of forest recovery for the department is 1,242 hectares/year, equivalent to 2.03 % per year, according to the existing forest of the year 2010 (INAB et al., 2019). Most of the forest areas are located at mountaintops and the Fuego volcano. Figure 4 shows the forest cover dynamics of Chimaltenango for the period 2010-2016 in hectares per year. Color green is forest that has been kept, white is for land without forest, orange indicates areas of forest recovery, and red indicates areas where forest cover was lost in that period.


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**Figure 4:** Forest cover dynamics of Chimaltenango for the period 2010-2016 in hectares per year. Color green is forest that has been kept, white is for land without forest, orange indicates areas of forest recovery, and red indicates areas where forest cover was lost in that period.
dynamics of Chimaltenango department between 2010 and 2016.

3. DESIRED FUTURE LANDSCAPE (VISION FOR THE LANDSCAPE)

The desired future vision for the forest landscapes of Guatemala comes from The National Development Plan: “K’atun, Nuestra Guatemala 2032” and the National Forest Landscape Restoration Strategy 2015-2045. The former was formulated by the National Council of Urban and Rural Development (CONADUR), an entity that organises and coordinates the public administration through the formulation of development policies, budget plans and programs, and through the promotion of inter-institutional, public and private coordination. The K’atun considers five thematic areas, namely: 1) Urban and rural Guatemala; 2) Wellbeing for the people; 3) Wealth for all; 4) Natural resources today and for the future; and 5) The State as human rights guarantor and driver of development.

The fourth thematic area of the plan states that sustainable development cannot be conceived without an adequate management of the environment and natural resources. It organises goals, results and guidelines based on priorities as follows: 1) Climate change mitigation and adaptation; 2) Conservation and sustainable use of forests and biodiversity for climate change adaptation and mitigation; 3) Sustainable management of water resources; 4) Agricultural technification and family agriculture for food security with cultural, ethnic and age relevance; and 5) Land use and regional planning, among others.

The K’atun plan takes into account the different agreements issued by the United Nations, Economic Commission for Latin America and the Caribbean - ECLAC, IPCC and others, prioritising and considering a number of strategic results focused on the conservation and sustainable management of the country's forest resources. Two of them read: a) Maintain 32% of the country’s area covered with forests that generate economic and environmental goods for the population; b) In 2032, at least 29% of the country's territory is covered by natural forests and the forest cover has been increased by 3% through ecological restoration on lands that have the capacity to be used for the protection and conservation of forests (CONADUR, 2014)9.

As part of the Bonn Challenge initiative and the 20x20 Initiative, Guatemala committed itself to the restoration of 1.2 million hectares, in order to contribute to the integral and sustainable development of the country and the welfare of its population. In 2012, the National Forestry Institute (INAB), which is the national forest service outside protected areas, together with the Ministry of Environment and Natural Resources (MARN), the National Council of Protected Areas (CONAP), which is in charge of forest management within protected areas, and the Ministry of Agriculture, Livestock and Food (MAGA) supported the creation of the National Board for Forest Landscape Restoration (Mesa Nacional de Restauración del Paisaje Forestal). The first agreement of the government institutions was the creation of a participatory space to share and strengthen knowledge among stakeholders and sectors involved in the restoration of ecosystems. In addition, short, medium and long-term commitments were established for the development of restoration activities in Guatemala. Furthermore, the board defined the term “Forest Landscape Restoration-FLR” for the country.

The definition is as follows: “Process oriented to recover, maintain and optimize biological diversity and the flow of ecosystem goods and services for development, adjusted to the system of local values and beliefs,
and implemented with an intersectoral approach” (Mesa Nacional de Restauración del Paisaje Forestal de Guatemala, 2018)\textsuperscript{10}.

Once the board was integrated, some preparatory projects were developed. As a starting point, in 2013, the map of potential areas for FLR was generated (Figure 5), with the purpose of identifying and mapping the potential areas for FLR in the country. In the following years, between 2014 and 2015, the National Forest Landscape Restoration Strategy was developed, formulating the philosophical, strategic and programmatic framework of the Strategy, with a thirty-year execution period (2015-2045).

In September of 2015, the Congress of Guatemala approved the PROBOSQUE Law (Decree 2-2015), which includes a new forestry incentive programme whose purpose is to promote the establishment, recovery, restoration, management, production and protection of forests. This law was promoted in the final stages of the Forestry Incentives Programme (PINFOR 1997-2016) created by the Forestry Law of 1996, to give continuity and encourage coordination between government agencies, forestry sector and the FLR board.

In 2018, the FLR Board identified the potential actions for forest landscape restoration in Guatemala, the priority actions fall in the following categories: a) agroforestry systems, combining forest species, staple crops and/or vegetables; b) cocoa, banana, mahogany agroforestry system, an association system where cocoa is the main crop and banana is temporary shade; c) forest plantations; d) silvopastoral systems; and e) riparian and protected forests.

The strategy will promote the implementation of proposed REDD+ activities within the National Emissions Reduction Program by promoting incentives and financial mechanisms for the increase of carbon stocks, through reforestation, the promotion of agroforestry systems and forest landscape restoration. Therefore, the strategy is an effort to implement the National REDD+ Strategy, thus responding to the commitments of the different global environmental agreements ratified by Guatemala: the Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Convention to Combat Desertification and Drought. The strategy is aligned with the objectives of the National Biodiversity Strategy, and will allow for a categorical advance towards several of the national biodiversity goals, towards the Aichi goals and towards the (then) Millennium Development Goals (Mesa de Restauración del Paisaje Forestal de Guatemala, 2015)\textsuperscript{11}.

\textsuperscript{10} Mesa Nacional de Restauración del Paisaje Forestal de Guatemala 2018. Oportunidades de restauración del paisaje forestal en Guatemala. 44 Páginas
FOREST LANDSCAPE RESTORATION –FLR- IN THE DEPARTMENT OF CHIMALTENANGO, GUATEMALA.

1. Introduction

The department of Chimaltenango was the landscape chosen for this study because it was one of the areas that showed a substantial gain in forest cover in the 2016 National Forest Cover Map published in May 2019 compared to the 2010 map. The analysis is not focused on a specific project but on 10 counties (municipios) of the department, the area where more forest cover was gained. Different owners or managers of forestland were contacted for the interviews, including two municipalities, a private owner of a large piece of land (180 hectares) and eleven small owners or holders of land (0.22 to 11 hectares). Given that government forest incentive programmes are the main mechanism for FLR in the country, most of the information is related to them.

2. Implementation

In 1997 the National Forestry Institute (INAB) began to implement reforestation and forest management actions with the Forest Incentives Programme (PINFOR) created by the 1996 Forestry Law. These actions have been maintained to date, and have recently been reinforced by the creation of the new forestry incentive programme, PROBOSQUE in 2015. The PROBOSQUE law and its incentive programme is the main public financing instrument for the implementation of the National Forest Landscape Restoration Strategy, together with the incentive programme for small holders of forest or agroforestry land (PINPEP), created in 2010, are not only the main financial mechanisms for FLR in the country, but also the mechanisms with which the government wants to achieve the Bonn Challenge goals.

PROBOSQUE proposes 30-year goals, including: 375,000 hectares of natural forests for conservation; 125,000 hectares of natural forests for timber production; 300,000 hectares of forest plantations (200,000 hectares for industrial production and 100,000 hectares for energy-fuel) and 200,000 hectares for restoration (INAB, PFN, 2015). This programme is the main government financial mechanism for FLR in the country and provides annually around US$50 million (Forestry Information System of Guatemala www.sifgua.org.gt).

FLR actions are developed by owners or small holders of forest land, whom for the most part, have received financial support from existing forest incentive programmes, such as the Forest Incentive Programme for holders of small areas of forest or agroforestry lands (PINPEP) and the PROBOSQUE programme. Additionally, at the field level, several organisations have facilitated or contributed to the promotion and implementation of some FLR activities.

Following the launch of the Bonn Challenge in 2011, many NGOs have actively supported the enhanced adoption of FLR in Guatemala’s policy processes. Organisations such as IUCN, Rainforest Alliance, FAO, WRI and others, have played a significant role in encouraging the adoption of FLR as an approach to sustainable forest management in Guatemala. Their assistance has focused on: a) providing technical knowledge and tools; b) strengthening democratic participation of different sectors in the design of the PROBOSQUE Law; c) funding national institutions and key advocacy processes; d) supporting the creation of the National Forest Landscape Restoration Roundtable (MNRPF); e) supporting collaborative research efforts to improve the FLR evidence base; and f) developing local initiatives with high impact at the national level.

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Some of the practices used in restoration that have been applied by different initiatives in Guatemala are: a) Reforestation, b) Enrichment, c) Use of native species, d) Agroforestry with annual and permanent crops, e) plantations in riverbank areas and mangroves, f) Natural regeneration management, g) Management of ecological succession through the use of nurse plants, h) Silvopastoral systems, and i) management and recovery of water recharge areas.

The table below shows the types of activities that the PINPEP and PROBOSQUE incentive programmes have supported in the Chimaltenango department:

<table>
<thead>
<tr>
<th>PINPEP (2007-2018)13</th>
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</thead>
<tbody>
<tr>
<td><strong>Type of activity</strong></td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>Forest plantations</td>
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<tr>
<td>Agroforestry systems</td>
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<tr>
<td>Forest management for conservation</td>
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<tr>
<td>Forest management for production</td>
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<tr>
<td><strong>TOTALS</strong></td>
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<table>
<thead>
<tr>
<th>PROBOSQUE (2017-2018)</th>
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<tbody>
<tr>
<td><strong>Type of activity</strong></td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>Forest management for conservation</td>
</tr>
<tr>
<td>Forest management for production</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
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</tbody>
</table>

2.1. Stakeholders

As mentioned in Part I, INAB in coordination with the Ministry of Agriculture (MAGA), Ministry of Environment (MARN) and the National Council of Protected Areas (CONAP)14 and other institutions promoted the creation of the National Forest Landscape Restoration Board, in order to implement the National Forest Landscape Restoration Strategy.

FLR actions seem to be increasing. During the interviews, some respondents commented that they started undertaking restoration activities between 1999 and 2005 (37%), more than half of them started in recent years, 2015 to 2018 (54%), and in only one case, they started 30 years ago. FLR actions have gained more support and technical assistance from governmental organisations and NGOs. These actions have allowed the different stakeholders a better insight of FLR in the region, however successful experiences have not been well identified, analysed and documented yet.

Stakeholders were identified in three groups that actively participate in FLR processes they are described below:

1. Government Institutions

All respondents in the area of study know that INAB is the institution in charge of forest resources administration, providing technical assistance to forest owners, issuing forest permits and approving the access to the forestry incentive programmes (PINPEP and PROBOSQUE). Interviewees identified INAB as

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14 Institutions that form the Interinstitutional Coordination Group (GCI) from the National Forest Landscape Restoration Roundtable.
the institution with the biggest role in FLR actions in the region. Fifty seven percent (57%) of respondents said they directly receive technical assistance and funding from the incentive programme. Even though the sample is small, this shows how important the government institution and funding is for FLR. That figure also shows that it is not the only reason why forest has been recovered.

2. Non-Governmental Organisations

Interviewees agreed to mention several NGOs that work in the region and support forestland owners with technical assistance and training. Due to the large area of the department, NGOs cover different areas, but the ones working in FLR that were identified during this research project are described below.

a) Tikonel Association

Tikonel is an organisation that supports local micro businesses in the municipality of San Martin Jilotepeque (north of the department). Tikonel has supported forestry actions, promoting tree nurseries, forest plantations with the objective of contributing to environmental protection and adaptation to climate change. With this approach, the association contributes to improving the quality of life of agroforestry producers in indigenous communities, providing technical assistance and supporting local forest owners to access forest incentive programmes. Additionally, Tikonel promotes income generation and local employment, through capacity building, added value and market access of timber and non-timber handicraft products. Forty three percent (43%) of interviewees said they received technical support from this association.

b) The Nature Conservancy (TNC)

A well-known international conservation organisation, TNC has been promoting and supporting some FLR actions in the Xayá and Pixcayá catchments because they provide a third of surface water used for household provision in the Metropolitan Region of Guatemala (CITE). Thirty six percent (36%) of interviewees said they have received technical assistance from TNC.

TNC has supported the Civil Environmental Association Xayá (ACAX) for sustainable management of forests and water resources of the Xayá River catchment, which is a very important area for water provision of the Metropolitan Region of Guatemala (Guatemala City). Nowadays TNC supports the FUNCAGUA initiative (Water Fund for the Metropolitan Region of Guatemala) and its different stakeholders in catchment area which includes among others the Municipality of Tecpán Guatemala and the Municipal Water Company of Guatemala City (EMPAGUA).

c) Private Institute for Climate Change Research (ICC)

The ICC has supported reforestation activities with several forestland owners and municipalities located in the upper part of the river basins that drain southwards to the Pacific Ocean. Twenty one percent (21%) of interviewees mentioned the technical support received from ICC. Two of them were municipalities (Chimaltenango and Tecpán Guatemala), the biggest land owners in the study sample. In the case of the Xayá catchment, west of Chimaltenango, the activity is carried out in coordination with the Civil Environmental Association Xayá (ACAX) and the municipality of Tecpán Guatemala. Some of the actions carried out in the area are: tree nurseries, reforestation activities and training on management of forest plantations.

d) Civil Environmental Association Xayá (ACAX)

It is a local organisation formed by the Municipality of Tecpán Guatemala, farm owners, NGOs, Community Development Committees (COCODES) and a representative of the Municipal Water Company of
Guatemala City (EMPAGUA). It was integrated with the objective of promoting the sustainable management of forests and water resources of the Xayá River catchment\textsuperscript{15}. This association could serve as the basis to establish a compensation mechanism for water environmental services with users in Guatemala City, which could finance reforestation actions aimed at the conservation of the forest cover of the micro river basin. Twenty one percent (21\%) of interviewees mentioned the technical support received from ACAX.

e) Other organisations or companies

Other NGOs mentioned during the interviews include IUCN and Symbiosis Foundation that together with the Mankaqchikel, an association of municipalities have supported capacity building and technical assistance for the sustainable management of forestland of the Chimaltenango and Zaragoza municipalities. Additionally, one respondent said he received technical support from a cement company that operates nearby (Cementos Progreso).

3. Forestland owners and small holders

Forest owners and small holders of forestlands are the main stakeholders in the FLR process as they implement direct actions on the ground. They can be divided in three main categories: owners or holders of small forestland plots (0.22 to 11 hectares, according to the interviews), owners of large forestlands (180 hectares in one case) and municipalities (150 and 472 hectares). FLR actions have different objectives with each stakeholder group, depending on the type of forest products they want (timber – non timber) and the size of their properties.

a) Owners or holders of small forestlands

Of the interviewees 79\% were small holders. For them FLR is focused on improving environmental conditions of their plots, reducing soil erosion and improving water availability, but also for obtaining economic benefits such as timber products and firewood.

b) Owners of large forestlands – private owners

One of the interviewees was a large forestland owner. For him FLR is focused in improving environmental conditions of his properties, he implemented forestry management activities for timber production, but also for sustainable ecotourism, therefore forest conservation and restoration had a high priority.

c) Municipalities

Representatives of two municipalities were interviewed. For the municipalities the high priority is restoration of degraded areas and municipal forestland conservation. Forestry management for large-scale timber production is not their goal, but the sustainable management of municipal lands for firewood and small timber products.

During the research for this study it was also found that the roles of the different stakeholders related to FLR in the region and in the country, have been established in the forest incentives management regulations. The table below shows a general perspective of some of the different roles for FLR
stakeholders.

\textsuperscript{15} The micro river basin is located north of the department in the municipalities of Tecpán Guatemala, San José Poaquil and Santa Apolonia.
<table>
<thead>
<tr>
<th>Name</th>
<th>Sustainable Forest Management</th>
<th>Forestry Incentives</th>
</tr>
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</table>
| INAB                     | • Approval of forestry management plans and/or harvesting of timber products outside protected areas.  
                           | • Supervision and certification of reforestation and forestry plantations outside protected areas.  
                           | • Issuing and approval of forestry permits and timber transport paperwork, outside protected areas.  | • Approval of management plans for forestry incentive programmes access (PINPEP y PROBOSQUE).  
                           |                                                                                              | • Supervision and certification of correct implementation of forestry/reforestation management plans.  
                           |                                                                                              | • Together with the Finance Ministry management of forestry incentives certificates and payment to beneficiaries.  |
| CONAP                    | • Approval of forestry management plans and/or harvesting of timber products within protected areas.  
                           | • Supervision and certification of reforestation and forestry plantations within protected areas.  
                           | • Issuing and approval of forestry permits and timber transport paperwork within protected areas  | • Approval of management plans for forestry incentive programmes access (PINPEP y PROBOSQUE) within protected areas.  |
| Municipalities           | • Approval of family forestry permits¹⁶                                                                 | • Promote the restoration of degraded lands within municipal lands.  
                           |                                                                                              | • Establishment and/or promotion of municipal and community tree nurseries.  |
| Forestry technicians     | • Development and supervision of sustainable forestry management plans, according to INAB regulations  | • Development and supervision of sustainable forestry management plans, according to INAB, PROBOSQUE and PINPEP regulations.  |
| and forestry registered  |                                                                                              |                                                                                     |
| consultants              |                                                                                              |                                                                                     |
| Owners and holders of    | • Apply for the approval of sustainable forestry management plans in INAB or CONAP.  
                           | • Implement the activities established in the approved forestry management plans.  
                           | • Reforest or recover the forest cover in the harvested area, according to the forestry management plan.  | • Apply to forestry incentive programmes with INAB and CONAP.  
                           |                                                                                              | • Implement the activities established in the approved forestry incentive management plans  
                           |                                                                                              | • Maintain restored forest cover, guaranteeing its proper forestry management.  |
| forestlands               |                                                                                              |                                                                                     |
| NGOs and local groups    | • Technical support/capacity building for implementation of sustainable forestry and/or FLR activities.  
                           | • Support for the implementation of FLR activities.  | • Technical support/capacity building for access to forestry incentive programmes.  
                           |                                                                                              | • Support for the implementation of FLR activities.  |

### 2.2. Technical design of restoration interventions

As part of the National Forest Landscape Restoration Strategy (Forest Landscape Restoration Board of Guatemala, 2015), opportunities for restoring the forest landscape in Guatemala (National Forest

¹⁶ Permits which allow families to harvest up to 15 m³ of timber for own consumption, approved by the Family Forest products consumption regulation (Board of Directors, INAB, 2015).
Landscape Restoration Board of Guatemala, 2018) were identified. These opportunities were presented to the Bonn Challenge at the Third Meeting held in 2018. Within these there are a series of transitions, highlighting those that are oriented to forest plantations or agroforestry systems (SAF).

However, at the field level, as it is the case of Chimaltenango, restoration interventions are defined and designed according to the existing conditions in the forestlands or plots where restoration is carried out. Forestry technicians\(^\text{17}\), evaluate the characteristics of forestlands and the objectives of the forestland owners to design FLR actions. Forestry plantations with mixed species (pines, cypress and alders) and implementation of agroforestry systems (annual crops and timber species) are the main categories proposed for FLR in the region.

The design of forest plantations has been based on the criteria and parameters established by the forest incentive programmes and their different modalities, both for the certification and payment of the projects.

### 2.3. Enabling activities

Forest incentive programmes were identified as the main activities enabling or promoting FLR. These programmes are considered an important tool to achieve the objective of the National Forest Landscape Restoration Strategy and the Bonn Challenge for Guatemala, which is 1.2 million hectares of degraded land restored over a period of 30 years. The coordination of actions defined through the forestry incentive programmes have allowed the Government of Guatemala to invest in the establishment of reforestation actions, agroforestry systems and fruit tree plantations.

The National Forest Landscape Restoration Strategy and the incentive programmes PINPEP and PROBOSQUE are the main policy instruments that have enabled the implementation of FLR actions in the department of Chimaltenango. During the interviews respondents mentioned that they had received incentives from PINPEP (36%) and PROBOSQUE (21%) to implement forestry activities. However an important finding was that 43% of the interviewees mentioned that they has used their own resources to implement restoration activities, and this can be because of some limitations that were mentioned during the interviews such as: a) bureaucracy related to forest incentive programs (43%); b) costs of registered forestry consultant (29%); and c) cost of management at the start (14%).

### 3. Monitoring

According to national forestry legislation, the implementation of policy instruments, such as the forestry incentives programmes PROBOSQUE and PINPEP are evaluated by the governmental institutions responsible for their implementation (INAB), while at field level, monitoring is carried out both by INAB and the owner of the forestland.

In 2018 the National FLR Roundtable with the support from FAO\(^\text{18}\) developed the monitoring, evaluation and learning system for the National FLR Strategy (MEA in Spanish). The system defines monitoring as the collection of information obtained in the measurements made over time, through a system of indicators that measure the scope of proposed objectives.

Evaluation was defined as the process of indicator analysis that shows the scope of the objectives according to the planning, and provides feedback to situations that must be modified or changed to resume the path towards the objective. From this analysis, progress or final reports of the parameters that

\(^{17}\) The forestry technician or professional is the one that designs the forestry management plan, according to its objectives (Board of Directors INAB, 2017).

\(^{18}\) United Nations Food and Agriculture Organization.
are being measured can be developed\textsuperscript{19}.

During interviews carried out with INAB and UICN representatives of both institutions mentioned that one of the challenges for restoration in Guatemala is the monitoring and evaluation of restoration actions. Forest landscape restoration programmes and projects must demonstrate their effectiveness over time, both in the achievement of restoration goals, and in the management of funds and their cost-effectiveness. To do this, it is necessary to implement the following: a) build baselines that allow future comparisons, b) implement monitoring and evaluation mechanisms to identify and quantify the changes and trends of restoration, the impact of the actions on the quality of life of the people involved and the conservation of environmental services. The information that is generated locally must feed the monitoring system, so that the country has tools for the evaluation of its national and international restoration commitments. This information will also serve as a guide for investment and training in restoration actions.

For this case study two levels of FLR monitoring were identified: 1) at the policy instruments level (forestry incentive programmes and the National FLR Strategy) and 2) at the site level (forestland or plot). In the table below the differences between these two levels of monitoring, are presented.

Differences and similarities found between the forest monitoring processes, Forest Incentive programs and at field level in Chimaltenango at the individual project or plot.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Incentive programme level</th>
<th>At field level</th>
</tr>
</thead>
</table>
| **Was there a formal written monitoring plan?** | • There are two monitoring types: regional and country level. Both are carried out annually, through the review of approvals by government institutions. Voluntary FLR is not monitored.  
  • The National FLR Board with the support from FAO, designed a Monitoring, Evaluation and Learning System for the National FLR Strategy, it is still not fully being implemented, so far there are too many indicators for evaluation, therefore the FLR roundtable is trying to reduce the number of indicators to be able to implement an easier and effective monitoring process. | • Is part of the forestry management plans approved by INAB or CONAP.  
  • Each management plan has a monitoring table with indicators to be evaluated.  
  • The monitoring system for the FLR Strategy is still not being implemented. |
| **Who was responsible for monitoring?**       | • Statistically, it is carried out by forestry management institutions (INAB or CONAP), based on the records of forestry management plans approvals  
  • Geospatially, it is carried out through the Inter institutional Forests and Land Use Monitoring Group (GIMBUT)  
  • The Forest Landscape Restoration Programme from the Forest Management and Conservation Department of INAB together with the National FLR Board are responsible for the monitoring of the National FLR Strategy implementation. | • Government institutions (INAB and CONAP) carry out monitoring of forestry permits, management plans and reforestation plans, verifying compliance of approved activities.  
  • Forestland owners and holders with the support from forestry technicians and registered consultants, although monitoring is not very detailed. |
| **Were responsibilities for monitoring clearly defined?** | • For geospatial monitoring, GIMBUT has coordinated monitoring actions.  
  • The National FLR Strategy has defined the responsibilities for the different members. The Interinstitutional Coordination Group (GCI in Spanish) of the FLR Board, led by INAB, coordinates monitoring actions. | • Government institutions have specific responsibilities for monitoring forestry permits and approved management plans. |

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20 The Ministry of Environment (MARN), Ministry of Agriculture (MAGA), National Forestry Institute (INAB), National Council of Protected Areas (CONAP), Secretariat for Planning and Programming of the Presidency (SEGEPLAN), National Geographic Institute (IGN) San Carlos of Guatemala University (USAC), Landívar University (URL) and Del Valle de Guatemala University (UVG) form GIMBUT.

21 The Ministry of Environment (MARN), National Forestry Institute (INAB), National Council of Protected Areas (CONAP) and the Ministry of Agriculture (MAGA) form GCI.
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Incentive programme level</th>
<th>At field level</th>
</tr>
</thead>
</table>
| **Who finances the monitoring?**                  | • Government institutions through their annual budgets.  
• International cooperation that supports the implementation of the National FLR Strategy.                                                                                                                                   | • Forest owners that want to do it voluntarily.  
• Government institutions through their personnel and resources on the field, supervising forestry management and restoration plans.                                                                              |
| **Over what period was/is monitoring taking place?** | • INAB and CONAP develop annual monitoring through forestry statistics. INAB has a database of forestry management plans approved for incentive programmes.  
• GIMBUT carries out monitoring of forest cover and land use changes through geospatial information, every five years.                                                                                 | • Once a year to verify survival of plantations.  
• In reforestation projects under forestry incentives, monitoring is carried out the first 6 years of the plantation.  
• Specific FLR projects and initiatives supported by NGOs carry out monitoring process every year, or depending on the restoration action they implemented/supported. |
| **What indicators are used?**                      | • The MEA of the National FLR Strategy proposes 21 monitoring indicators for vegetation, fauna; 4 specific indicators for mangrove restoration and 4 for riparian forests, and 9 socioeconomic indicators. The National FLR Board is still assessing these, as they are still too many indicators to be able to carry out an effective monitoring of restoration processes in the country. |                                                                                                                                                                                                          |
| **Is there any monitoring report format? (And who has used it?)** | • The MEA proposes a format for data collection for vegetation, fauna, water sources, riparian forests and socioeconomic aspects. The National FLR Board is still discussing their implementation on the field.                                                                 | • Projects under forestry incentive programmes have specific monitoring report formats, and are used by technical staff from INAB or CONAP to assess the compliance of management plans approved. |
| **Has monitoring been used to make any changes in FLR actions?** | • There is no information that shows that monitoring has been used to make changes in FLR actions.                                                                                                                                                                                                                                              |                                                                                                                                                                                                          |
4. Outcomes/benefits

The National FLR Strategy mentions that direct beneficiaries from FLR actions are forestry communities, indigenous peoples, forestry private sector, municipalities, academy, forestry and agroforestry producers, and medium and small businesses present in the forestry productive chain.

Indirectly, society in general benefits from FLR actions in Chimaltenango, because more forest resources are being produced, capacity to regulate the water cycle in forestlands is improving, erosion of soils is being reduced, and ecosystems connectivity and biodiversity in the region is being preserved.

4.1. Local livelihood improvements

During the interviews in Chimaltenango respondents indicated the purpose of their restoration actions was to improve their livelihoods. In the table below the main benefits (purpose of restoration) that were expected from FLR actions by the interviewees:

<table>
<thead>
<tr>
<th>Purpose of restoration actions</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber and firewood production</td>
<td>64%</td>
</tr>
<tr>
<td>Conservation of natural resources</td>
<td>36%</td>
</tr>
<tr>
<td>Water recharge, availability</td>
<td>21%</td>
</tr>
<tr>
<td>Sustainable tourism (income)</td>
<td>14%</td>
</tr>
<tr>
<td>Restoration of forestland</td>
<td>14%</td>
</tr>
<tr>
<td>Agroforestry</td>
<td>7%</td>
</tr>
</tbody>
</table>

Before FLR actions they had no access to forestry products such as timber and firewood. Now they obtain direct economic benefits by using and selling those products. Indirectly there is employment and income opportunities for other local residents, who also have access to locally produced firewood, which is used as the primary source for energy and cooking. Monetary benefits granted by the forestry incentive programmes are mainly used to maintain and diversify their forestry-restoration-agriculture activities. Most of the money is used to maintain reforestation-restoration actions, and also allows forestland owners to hire local people for these activities. Other benefits included improvement in their water sources and implementation of ecotourism activities, which also provides a monetary income.

4.2. National benefits

Interviews carried out with key members of the National FLR Board (INAB and UICN) to assess the national benefits by restoration actions agreed to mention that all stakeholders that participate in the roundtable are direct implementers and collaborators of restoration actions; therefore they are also beneficiaries.

The National FLR Board has estimated that in the implementing period of the National FLR Strategy (30 years, 2015 to 2045), which includes the Bonn Challenge goals for the country. The co-benefits from restoration will be more than $43,000 million, only under the concept of employment income, with close to 600,000 generated jobs, without considering profits, goods and services from food, timber, firewood, carbon and water for irrigation, drinking and electricity production. Agroforestry products could be a much more meaningful contribution, taking into account that coffee is one of the most important products of the country. FLR will also contribute to goods and services provision, maintenance and diversification of rural livelihoods, particularly from population in poverty situation.

The implementation FLR Strategy will also potentially contribute to: a) strengthening environmental and rural development institutions; b) market development for environmental goods and services; c)
strengthening of implementation platforms (municipalities, businesses and forestry communities); d) development of applied research; and e) communication and awareness of the Guatemalan society.

4.3 Ecological benefits

Respondents of interviews in the field mentioned changes in the quality of some local environmental parameters these are only based on their assessments and not in measurements or monitoring reports. Half of the people (50%) interviewed mentioned ecological benefits from restoration activities such as reduction in soil erosion, 7% mentioned water sources protection and 14% biodiversity conservation as the main ecological benefits.

There was no evaluation or monitoring report found that could help determine how forest landscape restoration in the Chimaltenango area has improved the connectivity and quality (condition) of the forest landscape, and how this in turn has contributed to local biodiversity conservation. The two municipalities that were interviewed mentioned that FLR activities have helped to improve the conditions of municipal forestlands, that mostly protect key water sources and endangered species habitats.

5. Funding

Having enough funding to achieve the goals of restoration in the country is, without a doubt, one of the biggest challenges that we face today. In this sense, the profitability of many restoration actions is an incentive to attract investment from various sectors.

Guatemala has made significant progress with tools and information to identify where restoration actions should be carried out, what the options for transitions at a spatial level are and what the approximate profitability is. The next steps consist precisely of applying and adapting this information to specific areas and at a local scale to identify the cost of restoration actions, needs and sources of financing. The challenge is to design business plans and update the investment portfolio as a tool to encourage investment in various forms of restoration throughout the country.

The main financial source for FLR activities in Guatemala is responsibility of the Government, through forestry incentive programmes, PINPEP and PROBOSQUE. The Ministry of Finance (MINFIN), in coordination with INAB, makes payments to beneficiaries. PROBOSQUE has an annual budget allocation equivalent to 1% of the State Ordinary Revenue Budget, and the PINPEP, an allocation not greater than 1% or less than 0.5% of the same budget. In spite of the fact that the 1% has never been met, the figures presented next have been significant and have been by far the main source of funding for restoration, which is a strength for Guatemala.

Nationally, between 2010 and 2018, the country invested more than US$ 293 million in forest restoration actions (reforestation, forest management, forest protection and conservation, and agroforestry systems implementation). A detail of the amounts invested by the different programmes (which include all their modalities) is presented below.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>PINFOR US$</th>
<th>PINPEP US$</th>
<th>PROBOSQUE US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>18,897,859</td>
<td>1,933,069</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>14,880,339</td>
<td>2,337,224</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>14,310,830</td>
<td>5,455,335</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>16,550,904</td>
<td>8,381,665</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>17,305,078</td>
<td>14,032,298</td>
<td></td>
</tr>
</tbody>
</table>
The resources shown in the table above are directly invested in restoration activities carried out in the field. There are no records of the resources allocated to the training and technical assistance of the incentive programmes beneficiaries, though they have probably been significant.

Within this investment category, the resources provided by the Government to INAB and other institutions must also consider the management of the incentive programmes, including monitoring and evaluation of activities. Thus, the MINFIN must assign 15% of the PINPEP resources and 20% of PROBOSQUE to INAB, which used these resources for supervision, management and technical assistance of beneficiaries.

The National FLR Strategy has estimated an investment from the State of about US$10,667 million over a period of 30 years for the implementation of FLR activities. From this amount, the government will invest US$3,947 million through the forestry incentive programmes. The private investment expected (municipalities, communities, businesses and NGOs) is of approximately US$5,333 million developing business models based in FLR activities. It is also expected to obtain funding from international sources.

The table below shows the types of activities and the funding (in US$) that the PINPEP and PROBOSQUE incentive programs have invested in the Chimaltenango department:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>PINFOR US$</th>
<th>PINPEP US$</th>
<th>PROBOSQUE US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>15,212,259</td>
<td>20,502,447</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>15,395,534</td>
<td>26,454,951</td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td>32,327,988</td>
<td>14,807,739</td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>34,259,797</td>
<td>20,131,616</td>
<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>112,552,803</strong></td>
<td><strong>145,684,774</strong></td>
<td><strong>34,939,355</strong></td>
</tr>
</tbody>
</table>

**SOURCE:** Forestry Information System of Guatemala (www.sifgua.org.gt)

6. Communication

During field interviews most of the respondents did not know about the Bonn Challenge and the

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commitment of Guatemala to this initiative. Neither did people know about the National FLR Strategy and the existence of the National FLR Board. Even INAB staff members from the region that includes Chimaltenango did not know if restoration activities implemented in the department were to fulfil the Bonn Challenge commitment (or the 20x20 Initiative).

People are mostly aware that Forest Incentive Programmes (PROBOSQUE and PINPEP) have restoration purposes, but they mostly associate those activities to government initiatives and not to international commitments. Government communication strategies are mainly focused on promoting reforestation and restoration for local and country benefits. Recently, efforts have been made by INAB to implement communication strategies: such as #YoReforestoChallenge (I reforest challenge), trying to involve population around the country in planting trees and restoring areas in their local communities, schools or businesses. But according to interviews with INAB personnel, there is still not a defined link between these communication activities and the efforts to promote the Bonn Challenge or the 20x20 Initiative within the country.

INAB implements communication actions through its website and the Forest Information System of Guatemala (SIFGUA), but their focus is on making forestry statistical information available. Some statistics about FLR can be found in the most recent Statistical Bulletin that contains information from 1998-2017; this bulletin disaggregates information of the three forest incentive programmes (PINFOR, PINPEP and PROBOSQUE), by each administrative region level of INAB and at the departmental level. The main information in this bulletin is the number of approved and certified incentive projects and the amount paid. There is also some information on reforested or restored area, depending on the forestry activity that received the incentive.

The involvement and appropriation of restoration actions by civil society and the public and private sector is an important challenge to achieve landscape restoration in Guatemala. The active participation of these actors in the various phases of a restoration process is key to success. This participation must be effective from the planning stage, so that the actors involved at different levels can define common objectives and agree on interests, benefits, costs and contributions for restoration. Consensual decision-making should be strengthened, both at the national, municipal and local levels (territories). The National FLR Board is an adequate platform to discuss the restoration issues; consequently, it must be kept active through the participation of all the actors involved and the feedback of the actions that are carried out through it.

7. Lessons learned

Following the launch of the Bonn Challenge in 2011, IUCN, together with INAB, promoted the creation of the National FLR Board, with the purpose of fostering a dialogue platform that would represent the Guatemalan forestry and environmental sector and other related sectors, to build the Forest Landscape Restoration Strategy of Guatemala.

The creation of the FLR Board and the incorporation of diverse stakeholders has been a very successful experience in the FLR process of Guatemala. The challenge is to maintain their participation and incorporate even more stakeholders as this will be key to achieve the goals established by the strategy, ultimately fulfilling the Bonn Challenge / 20x20 Initiative goals.

One of the most important challenges is to ensure that the design of programmes and projects is consistent with the approaches of the National FLR Strategy and with the priorities that have been established at the country level; in particular to simultaneously strengthen the management of the territories and the benefits for the local populations. In the case of Guatemala, restoration actions have been proposed for eight forest categories (riparian zones, mangrove, forest protection lands, forest production lands, agroforestry with permanent crops, agroforestry with annual crops, silvopastoral
systems and protected areas) meeting local needs and demands. The programmes designed should highlight and value the advantages of landscape restoration in its economic, ecological and social aspects.

The institutions related to the restoration of the forest landscape and the personnel directly involved must strengthen their technical capacities to develop projects and programmes to restore the landscape in its diverse modalities. Of particular importance is to build on the achievements of the Board, which has allowed the integration of various sectors to, on the one hand, broaden its intersectoral character and, on the other, ensure the representativeness of these sectors at the regional and local levels and in the initiatives and projects. There is an example of a regional FLR Board in southern Guatemala led by the ICC and was created through financial support from WRI.

Last but not least, in the interviews with INAB and IUCN, respondents agreed to mention that restoration actions must be based on scientific and technical information for adequate decision-making. In this sense, it is essential to promote research, strengthen and disseminate the results of research that adapts to the specific characteristics of the different territories. For this, it is necessary to strengthen communication between academia, state institutions and the private sector both for the prioritisation of research lines and for the implementation of applied research actions.

Carrying out analyses like this one, albeit more thorough, in all the regions of the forest administration of Guatemala could provide insights on the conditions that are enabling FLR to occur and what factors are currently limiting stakeholders to advance more rapidly or to be involved at all. According to interviewees in Chimaltenango, for example, 43% perceived the access to forest incentive programmes to be bureaucratic, and 29% argued that a limiting factor is the payment of a registered forest consultant to write or validate the restoration project application. Providing that type of support could help a faster growing process of forest restoration in the region. Entering formal programmes helps ensure monitoring mechanisms, which could justify investment in technical support to enter existing ones or creating new programmes.

8. References


