Restoration Barometer

Applying the Barometer of Restoration

Opportunities for harmonising ecosystem restoration monitoring in Central America: Cases of Guatemala, El Salvador, and Costa Rica

Alejandro Imbach & Tony Nello

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Published by: IUCN, Gland, Switzerland in collaboration with Central American Commission for Environment and Development (CCAD), San Salvador, El Salvador, and Central American Agricultural Council (CAC), San José, Costa Rica.

Produced by: IUCN, Regional Office for Mexico, Central America and the Caribbean (ORMACC), San José, Costa Rica

Recommended citation: Imbach, A. & Nello, T. (2024). *Applying the barometer of restoration: opportunities for harmonising ecosystem restoration monitoring in Central America. Cases of Guatemala, El Salvador, and Costa Rica.* IUCN, CCAD and CAC.

Technical review: Tania Ammour (IUCN–ORMACC)

Cover photo: © Ahmid Daccarett/IUCN

Layout by: Data Design Studios

Designed by: Marta Lucía Gómez Zuluaga

About
The new and improved Restoration Barometer now tracks ecosystem restoration progress by the public and private sector across all terrestrial ecosystems, including coastal and inland waters.

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Acronyms

ACB	Key Biodiversity Areas
ACRxS	Costa Rica Forever Association
AFOLU	Agriculture, Forestry, and Other Land Uses
ANACAFE	National Coffee Association
AP	Protected Areas
ARNPG	Association of Private Natural Reserves of Guatemala
AYA	Costa Rican Institute of Aqueducts and Sewers
BMU	Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety of Germany
CAC	Central American Agricultural Council
CATIE	Tropical Agricultural Research and Higher Education Center
CB	Biological Corridors
CCAD	Central American Agricultural Council
CENIGA	National Center for Geo-Environmental Information
CI	Conservation International
CMUNCC	United Nations Framework Convention on Climate Change
CNFL	National Power and Light Company S.A.
CONAP	National Council of Protected Areas
CONARROZ	National Rice Corporation
CONASAV	National Council for Environmental Sustainability and Vulnerabilities
CORBANA	National Banana Corporation
CORFOGA	Livestock Corporation
CRS	Catholic Relief Services
DCC	Climate Change Directorate
ESPH	Public Services Company of Heredia
FAO	Food and Agriculture Organization of the United Nations
FDN	Defenders of Nature Foundation
FDV	Green Fund
FIAES	Environmental Investment Fund of El Salvador
FIIAPP	International and Ibero-American Foundation for Administration and Public Policy
FONAES	Environmental Fund of El Salvador
FONAFIFO	National Forestry Financing Fund
FUNCAGUA	Foundation for the Conservation of Water in the Metropolitan Region of Guatemala
FUNDAECO	Foundation for Eco-development and Conservation, Guatemala.
FUNDECOR	Foundation for the Development of the Central Volcanic Range
GHG	Greenhouse Gas
GIZ	German Agency for International Cooperation
GREPALMA	Guatemalan Palm Growers Guild
ICC	Private Institute for Climate Change Research, Guatemala.
ICE	Costa Rican Institute of Electricity
IKI	International Climate Initiative
INAB	National Institute of Forests
IUCN	International Union for Conservation of Nature
IPCC	Intergovernmental Panel on Climate Change

KOICA	Korea International Cooperation Agency
MAG	Ministry of Agriculture and Livestock,
MAGA	Ministry of Agriculture, Livestock, and Food
MARN	Ministry of Environment and Natural Resources
MINAE	Ministry of Environment and Energy, Costa Rica
MRV	Measurement, Reporting, and Verification
NAMA	Nationally Appropriate Mitigation Action
NDC	Nationally Determined Contribution
UN	United Nations
ORMACC	IUCN Regional Office for Mexico, Central America, and the Caribbean
PDLS	Sustainable Local Development Plans
GDP	Gross Domestic Product
UNDP	United Nations Development Programme
PREP	Ecosystem and Landscape Restoration Program
RA	Rainforest Alliance
REDD	Reducing Emissions from Deforestation and Forest Degradation
ROAM	Restoration Opportunities Assessment Methodology
SAF	Agroforestry Systems
SICA	Central American Integration System
SIMOCUTE	Land Cover and Ecosystem Monitoring System
SINAC	National System of Conservation Areas
SINAMECC	National Climate Change Metric System
SNICC	National Climate Change Information System
WRI	World Resources Institute
WWF	World Wide Fund for Nature

Foreword

Terrestrial and coastal ecosystems are fundamental pillars for global environmental sustainability and the well-being of our communities. However, their degradation has led to biodiversity loss, a decline in ecosystem services, and increased vulnerability to climate change. The restoration of these ecosystems is an opportunity to prevent, halt, and reverse their deterioration, to recover and preserve their ecological functionality, strengthening their capacity to meet society's needs.

Recognizing the need to identify, evaluate, and monitor the progress of restoration within the framework of global restoration commitments, in 2016, IUCN, with the support of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection of Germany (BMU) and the International Climate Initiative (IKI), initiated the Restoration Barometer (initially known as the Bonn Challenge Barometer). This tool was created to support governments in their restoration efforts, providing up-to-date and quality information derived from monitoring the progress of ecosystem restoration in order to inform and improve decision-making.

For a decade, IUCN has actively promoted and supported the design and implementation processes of national and subnational restoration strategies, among others, in the Mexico, Central America, and the Caribbean region. More recently, we have worked hand in hand with three countries in the region: Guatemala, El Salvador, and Costa Rica, in the design and application of the Barometer.

This report synthesizes the results obtained from three applications of the Barometer in Central America: Guatemala, El Salvador, and Costa Rica. Its main objective is to analyze and summarize the results obtained in each country, highlighting common patterns and trends in terms of policies, planning, monitoring, financing, and impacts of restoration. Through this synthesis, we aim to make visible the evidence generated in the countries, showing tangible results, lessons learned and recommendations for scaling up and replicating the use of the Barometer at the national and regional levels. We also aim to contribute to strengthening the iniatives and integration processes in Central America.

The findings presented in this report not only seek to inform but also intend to contribute to generating significant change, by documenting specifically how the Barometer can support decision-makers in implementing effective policies and in evidence-based resource allocation for restoration.

The effectiveness of restoration efforts requires intersectoral collaboration involving governments, civil society, private businesses, and local communities. The Restoration Barometer has demonstrated its potential to contribute to intersectoral collaboration and regional harmonization, facilitating the monitoring and recording of progress towards restoration goals as outcomes of collective efforts.

We thank all individuals involved in the preparation of this report and reiterate our ongoing commitment to sustainable restoration in our region. We trust that this report will be a valuable tool for advancing the restoration of our ecosystems and contributing to the well-being of present and future generations.

Úrsula Parrilla,
Regional Director,
IUCN Regional Office for Mexico,
Central America, and the Caribbean

Foreword

The Central American Commission for Environment and Development (CCAD) of the Central American Integration System (SICA) is taking firm steps to address the triple crisis of biodiversity, climate, and economy affecting our region. Aware of the need to join efforts in an intersectoral manner to reverse ecosystem degradation and promote landscape–level restoration, one of CCAD's priorities is to accelerate the implementation of the AFOLU initiative, combining a focus on mitigation and adaptation, with a particular emphasis on the agricultural, forestry, and other land use sectors.

The Kunming Montreal Global Biodiversity Framework, with its goals set for 2030, guides us to, among other things, reduce threats to biodiversity. Of particular importance is the 30x30 goal to effectively restore our terrestrial, continental water, and coastal and marine ecosystems. The conservation and restoration of biodiversity, ecosystem functions and services, and biological integrity and connectivity are essential for the well–being of the population in our region.

In the region, many efforts are being made to make progress towards soil, forest and water conservation. The challenge is to measure these advances while managing public, private, and investment policies as enabling conditions. In other words, generating evidence that allows us to make better decisions towards the fulfillment of our national, regional, and international goals, such as the Bonn Challenge and the Convention on Biological Diversity.

The experience that the region is developing in a cross–sectoral manner is pioneering in terms of measuring progress in landscape restoration. The present report, which summarizes the results of the application of the Barometer of the Restoration, demonstrates that it is possible to unite efforts between the public, private and civil society sectors, in order to demonstrate the contributions of restoration with actions that combine forestry and agricultural practices. To adequately evaluate these efforts and ensure the sustainability of restored ecosystem services, it is essential to have tools for defining precise metrics. For example, the implementation of monitoring systems that measure water quality, recovered biodiversity, and carbon capture capacity in restored areas. These metrics will provide a solid foundation for assessing ecosystem services and making informed decisions about resource allocation.

Furthermore, it is crucial to recognize that environmental assets, such as restored forests or rehabilitated wetlands, should be considered as resources that require long–term maintenance investments. These investments can come from various sources, such as government funds, private financing, or even market mechanisms, such as payments for ecosystem services. By investing in the conservation and restoration of these assets, vital ecosystem services are not only protected but also promote the economic and social well–being of the region through job creation and the promotion of sustainable practices. In summary, the combination of robust metrics and appropriate financial mechanisms is fundamental to ensuring the success and sustainability of restoration and conservation efforts in the region.

The results presented in this report are an opportunity to: (a) build agreements to add information and progress reports on restoration at both the national and regional levels, (b) harmonize actions among countries in the region, and, no less importantly, (c) negotiate investments with tangible evidence. Likewise, as the Barometer is a globally–reaching instrument, it allows our region to position itself within the framework of the Central American Integration System.

We would like to acknowledge all the institutions that, under the leadership of the national authorities of environment and agricultural sectors, have made it possible to prepare this report. The results will undoubtedly allow us to move forward in the implementation and follow–up of the AFOLU initiative.

Fernando López Larreynaga,
Minister of Environment
and Natural Resources of El Salvador,
pro tempore President of the Central American
Commission for Environment and Development (CCAD).

Foreword

Agriculture, as a fundamental pillar in economic, social development, and environmental preservation, plays a vital role. Beyond its primary function in food and input production, this sector generates employment, drives income generation, contributes to rural development, promotes trade, and is an essential pillar for ensuring Food and Nutritional Security in our countries. However, it faces considerable challenges due to climate change and extreme weather events. The transformation of the agricultural sector in our region is an opportunity to strengthen climate resilience, competitiveness, and inclusion. The sector has the potential to implement actions that reduce greenhouse gas emissions, conserve resources such as water, soil, and forests, and promote more resilient production systems and the well-being of rural families.

Ecosystems play a fundamental role in providing essential environmental services that support food production, regulate the climate, ensure water availability, and conserve biodiversity. The restoration and conservation of these ecosystems, along with the promotion of environmental sustainability in general, are crucial elements for the development of the agricultural sector.

Achieving this requires close coordination and collaboration between different actors, as well as participation in the restoration and conservation of our natural landscapes. The Regional Initiative "Building Resilience in the SICA region under a synergistic approach between Mitigation and Adaptation focused on the Agriculture, Forestry, and Other Land Uses (AFOLU) Sector" is a coordinated effort within the framework of the Central American Integration System (SICA), driven by the Central American Agricultural Council (CAC) and the Central American Commission for Environment and Development (CCAD). This initiative aims to promote a comprehensive strategy that includes landscape restoration, rehabilitation and conservation of forested areas, adoption of resilient agroforestry and silvopastoral systems, as well as the transformation of agricultural practices towards sustainable, low-carbon approaches to increase productivity. The goal for 2030 is the restoration and conservation of ten million hectares of degraded lands and ecosystems in the SICA region, promoting Carbon Neutrality in agriculture, forestry, and other land uses by 2040.

In this context, the Restoration Barometer emerges as a valuable tool to support the monitoring and recording of progress towards the restoration goal within the framework of the AFOLU Initiative, which has been established based on the countries' commitments to the Bonn Challenge. The analysis contained in this report, particularly the findings related to the application of this tool in countries in the SICA region, provides an enlightening view of experiences, challenges, and opportunities in terms of available information and regional harmonization. It also represents a valuable contribution to the planning and execution of a monitoring, reporting, and verification system in the context of the AFOLU initiative at the regional level.

As the Pro Tempore President of the CAC, I express sincere gratitude to IUCN for its willingness to work together with the Central American Agricultural Council (CAC) and its commitment to supporting the AFOLU Regional Initiative and the SICA region.

Óscar Enrique Guardado Calderón,
Minister of Agriculture and Livestock of El Salvador,
pro tempore President of the Central American
Agricultural Council (CAC)

Executive summary

The IUCN Restoration Barometer is a tool used by governments to monitor and record progress towards restoration goals in various terrestrial ecosystems, coasts, and inland waters. It began as part of the Bonn Challenge and was later expanded to include more countries and ecosystem types. It has been implemented in several countries since 2018. The Barometer is based on eight indicators and records policies, planning, financing, and the area under restoration, as well as its environmental and socio-economic impacts. The reported data are publicly accessible. The Barometer aims to contribute to ecosystem restoration efforts and, more specifically, supporting decision-making processes in the region.

This document presents a synthesis of the results of the Restoration Barometer's application in three countries: Guatemala (2011–2020), El Salvador (2014–2021), and Costa Rica (2011–2020). The goal is to examine and summarize the results obtained according to each country's situation and highlight common patterns and trends in terms of policies, planning, monitoring, financing, and restoration impacts. This synthesis provides an overview of progress in restoration implementation in these countries and identifies lessons learned and opportunities for future Barometer applications at the national and regional levels. Considering the Barometer's relevance to the Central American Integration System, the analysis also included a documentary review, expert interviews, and consultations with representatives of the Central American Agricultural Council (CAC) and the Central American Commission for Environment and Development (CCAD) on the usefulness, added value, and potential use of the Restoration Barometer to complement the Monitoring, Reporting, and Verification (MRV) systems under the regional initiative "Building Resilience in the SICA Region through a Synergistic Approach between Mitigation and Adaptation, focusing on the Agriculture, Forestry, and Other Land Use (AFOLU) sector." Expert interviews included personnel from the Food and Agriculture Organization (FAO) and IUCN, who are part of SICA´s technical support group.

The results of the synthesis reported in *Chapter 3* of the report highlight the following elements:

- The general context of restoration in the three participating countries.

- The processes of applying the Barometer at the national level, including participating institutions and bodies, the information collection and validation process, timeline, and achieved results.

- A synthesis of the results in each country following the Barometer protocol's structure, which groups eight main indicators into two major categories: (i) action indicators; and (ii) impact indicators.

In addition to the aforementioned results, elements and comments derived from the comparative analysis are provided, including:

- There is a wide variety of institutions, policies, laws, strategies, programs, regulations, plans, and agreements related to restoration in the three countries. While each nation has adopted a unique approach to restoration, it is important to note that Barometer application processes focused on describing these frameworks rather than evaluating their relevance, significance, and sufficiency (**see Indicator 1 Policies and Institutional Arrangements**).

- The estimate of annual investment per restored hectare shows that El Salvador made the highest investment per hectare per year, reaching USD 200, followed by Guatemala with USD 159 and Costa Rica with USD 103 (**see Indicator 2 Financing**).

- In terms of funding sources: Costa Rica mostly involved public funds (94%), with a small contribution from international cooperation (6%). In Guatemala, three sources were involved: public funds (72%), the private sector (26%), and international cooperation (3%). El Salvador shows the greatest diversity in its funding, combining four sources: public funds (31%), international cooperation (27%), the private sector (26%), and philanthropy and national civil society (15%). In all cases, public funds are the main funding source, and international cooperation's participation varies (higher in El Salvador compared to Guatemala and Costa Rica). In Guatemala and El Salvador, private sector involvement is recorded. Only El Salvador shows philanthropy participation, and both El Salvador and Costa Rica record contributions from national civil society organizations (**see Indicator 2 Funding**).

- Regarding the technical planning of restoration at the national level, the countries conducted multiple exercises (Guatemala and El Salvador: 3 and Costa Rica: 8. The latter included sectoral exercises in crops such as sugarcane, coffee, banana and rice). The sectoral approach could be applied to other countries and to the regional perspective of restoration within the AFOLU 2040 framework. Additionally, before adopting the Barometer, the three countries previously conducted national applications of the Restoration Opportunities Assessment Methodology (ROAM). These exercises alllowed them to define geographic priorities for forest landscape restoration in various land use types, including productive uses (**see Indicator 3 Technical Planning**).

- – The three countries report multiple monitoring systems for restoration at the local and national levels: Guatemala and El Salvador with 5 systems each, and Costa Rica with 9 systems (**see Indicator 4 Monitoring Systems**).

- In terms of the number of restored hectares, Costa Rica reports the largest extent (482,000 ha), followed by Guatemala (379,192 ha) and El Salvador (238,948 ha). Regarding the Bonn Challenge targets, Costa Rica leads the highest percentage of progress (48%), followed by Guatemala (32%) and El Salvador (24%). Likewise, Costa Rica has the highest annual progress rate (4.8%), followed by El Salvador (4) and Guatemala (3.2%). In the three countries, over 86% of the restored areas involve 3–4 main modalities, demonstrating their importance: silviculture, agroforestry, and land and water protection (**see Indicator 5 Land**).

- Restoration actions in the three countries increased carbon storage by approximately 8 million tons of CO_2e, with Guatemala responsible for the most significant contribution (75%) (**see Indicator 6 Climate**).

- In terms of impacts on biodiversity, all countries included restored areas within Protected Areas (on average, 21% of restored areas in each country) and Key Biodiversity Areas (on average, 29% of restored areas in each country). Additionally, 35% of El Salvador's restored areas were in Biological Corridors. Costa Rica reported improvements in habitats of threatened or endangered species

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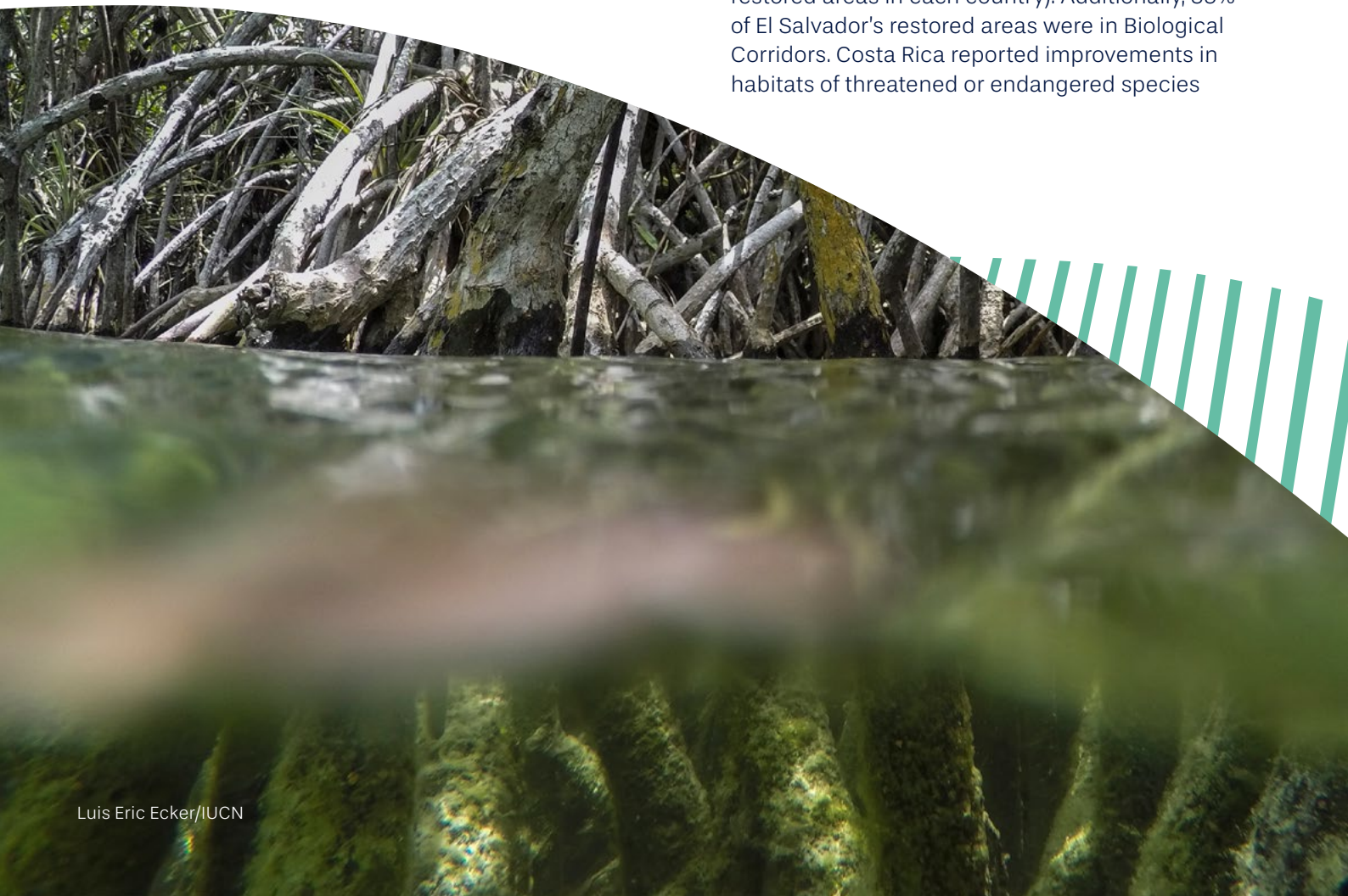
according to the IUCN Red List (**see Indicator 7 Biodiversity**).

- In the economic sphere, restoration had a key impact by creating 372 thousand new jobs in the three countries; with three restoration modalities prevailing: agroforestry (32% of jobs), planted forests and shrub cover (30% of jobs), and silviculture (20% of jobs) (**see Indicator 8 Economy**).

Based on the presented results and analysis (Chapter 3), *Chapter 4* summarizes the main challenges, opportunities, and recommendations identified by the Barometer applications in the three countries.

Challenges include underreporting and insufficient data, variability and lack of uniformity in data and methodology, limited capacity for data collection and recording, and incipient intersectoral coordination. To address these challenges, it is suggested to promote collaboration and data standardization, encourage participation, and enhance technological and spatial capabilities. Regarding opportunities, the Barometer is a useful tool for effecitve monitoring of restoration in strategic areas, improved planning and resource allocation, facilitation of private sector participation and enable data integration at multiple scales, both at local and national level. It also complements MRV

systems based on remote sensing by providing detailed information on restoration actions not easily measurable through satellite imagery. It also highlights the specific contributions of organizations that share their data.

Recommendations for Barometer adoption and use include strengthening and updating the normative framework, improving interinstitutional coordination, establishing a unified restoration information repository, securing support and commitment from government institutions, and continuing ongoing processes of Barometer ownership through knowledge and responsibility transfer to relevant national institutions.

Chapter 5 addresses the identified opportunities for the use and adoption of the Restoration Barometer within the framework of the AFOLU (Agriculture, Forestry, and Other Land Use) regional initiative in Central American countries. The AFOLU initiative aims to restore 10 million hectares by 2040 in the region. In this context, the Restoration Barometer could offer a straightforward and effective way to address restoration monitoring under the AFOLU MRV system currently in design. The adoption of the Barometer would harmonize monitoring systems among SICA countries and facilitate data aggregation and reporting both at the national and regional levels. Additionally, the Barometer has proven to be instrumental for more effective intersectoral coordination.

Within the framework of this analysis, consultations on the potential use of the Barometer within the AFOLU MRV system were carried out. The consultations included representatives from CAC, CCAD and the AFOLU–FAO technical team.

In the course of this analysis, consultations were conducted with representatives of the CAC, CCAD, and the AFOLU–FAO technical team on the potential of the Barometer within the AFOLU MRV system. As a result of these consultations, the potential of the Barometer as a complementary tool to the AFOLU MRV system was confirmed. Also, within the framework of the Central American integration, specific contributions and opportunities that could result from the regional adoption of the Barometer were identified.
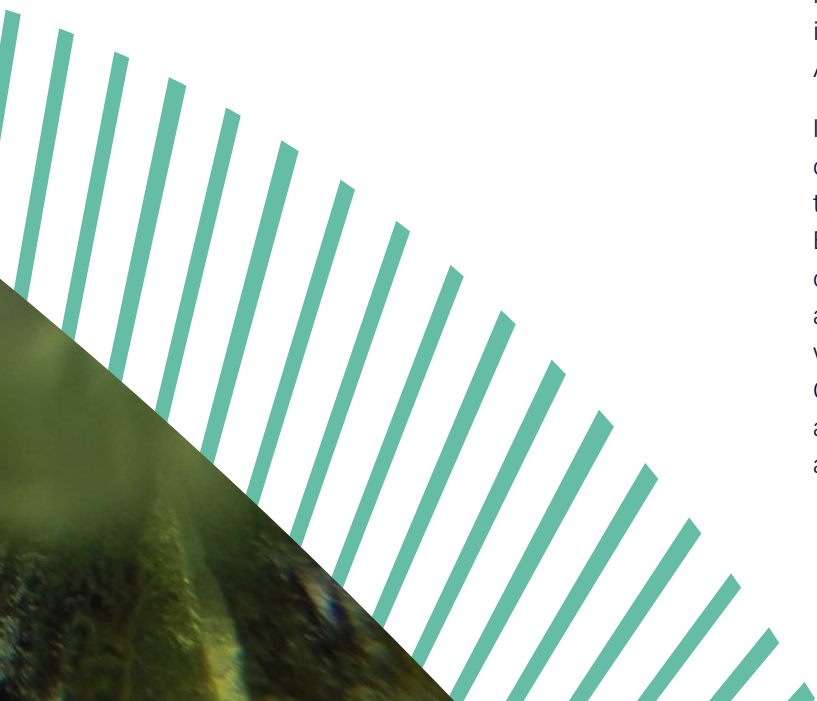
Finally, *Chapter 6* of the report presents the main conclusions of the study, highlighting that restoration offers opportunities to address environmental challenges and achieve the integration of conservation and development objectives; and, for this, reliable data and effective monitoring systems are required. In this regard, the Restoration Barometer is an adaptable and powerful tool for monitoring restoration in various ecosystems. Additionally, Barometer applications in some countries in the region have demonstrated its potential, as well as its feasibility for adoption and consolidation at the country level. There is opportunity to adopt the Barometer at the regional level. For instance, it can be part of the MRV system of the AFOLU initiative. Consultations with the CAC and CCAD teams confirmed interest in this adoption. They also acknowledged that there are still challenges regarding harmonization and agreement building at the regional level to consolidate a harmonized approach to monitoring adaptation and restoration actions.

In this sense, due to its structure, indicators, and applicability, the Barometer is aligned with the proposed framework and design principles for the AFOLU MRV system.

Recommendations for Barometer adoption and use include strengthening and updating the normative framework, improving interinstitutional coordination, establishing a unified restoration information repository, securing support and commitment from government institutions, and continuing ongoing processes of Barometer ownership through knowledge and responsibility transfer to relevant national institutions.

1. Introduction

1.1 About the IUCN Restoration Barometer

Ecosystem restoration involves preventing, halting, and reversing ecosystem degradation to recover ecological functionality and enhance productivity, while meeting societal needs (IUCN, 2022).

The Bonn Challenge is a voluntary, non-binding initiative aiming to drive landscape restoration actions in response to national priorities and fulfill international commitments. Launched in 2011, the initial goal was to restore 150 million hectares of deforested or degraded land by 2020, and 350 million hectares by 2030, in line with the United Nations Forests Declaration at the 2014 UN Climate Summit (IUCN, 2021).

As of 2022, a total of 74 entities from 61 countries, eight states, and five associations have committed to contributing to the restoration of over 210 million hectares under the Bonn Challenge (Bonn Challenge, 2020).

In 2016, with support from the German Federal Ministry for the Environment (BMU) and the Climate Initiative (IKI), IUCN developed the Restoration Barometer (originally launched as the Bonn Challenge Barometer) to assist governments in tracking restoration progress across terrestrial ecosystems. The Restoration Barometer was designed to meet the increasing demand for a systematic and universally applicable framework to identify, assess, and monitor global restoration commitments. At that time, the Barometer was primarily developed as a monitoring protocol for Bonn Challenge participants (IUCN, 2021).

In 2020, the Bonn Challenge Barometer was renamed "Restoration Barometer" to encompass progress reporting beyond Bonn Challenge signatories. Additionally, by 2021, the Restoration Barometer was updated to include all types of terrestrial ecosystems, including coasts and inland waters (IUCN, 2022).

1.2 Usefulness of the IUCN Restoration Barometer

The Barometer is a tool used by governments to monitor and record progress toward their restoration goals in all terrestrial ecosystems, coasts, and inland waters. Currently, 22 countries use it, and 50 endorse it. Users can record policies, planning tools, monitoring, and financing related to restoration. It also allows the recording of the area under restoration and its impacts on climate, biodiversity, and socio-economic benefits. Data submitted to the Barometer streamline and simplify the creation of national progress reports on restoration. The data are publicly available through the Barometer portal. Besides tracking progress in restoration, this tool highlights existing enabling conditions and why they work. it also identifies challenges for scaling up restoration actions and their outcomes.

1.3 Applications of the IUCN Restoration Barometer in Central America

Since 2018, IUCN has provided support and guidance for the implementation of the Restoration Barometer to various countries worldwide. The IUCN Regional Office for Mexico, Central America, and the Caribbean (ORMACC), provided technical assistance and capacity building to Guatemala, El Salvador, and Costa Rica, with dissemination activities in the region through the Central American Integration System[1] instances.

In El Salvador, an initial application was conducted in 2018, and later, results were updated and expanded through a second application in 2020. Costa Rica (2021) and Guatemala (2021) have also implemented national-level Barometer application processes. Based on these experiences, it was deemed appropriate to synthesize the results from the Barometer's application in the three Central American countries (Guatemala, El Salvador, and Costa Rica) for dissemination among decision-makers in the region.

Additionally, this synthesis aims to identify lessons learned and opportunities for future Barometer applications at the national and regional levels. This document presents the main results of the synthesis exercise.

1.4 Restoration Barometer Application Protocol

The Barometer allows tracking progress in the restoration of a wide range of ecosystems, classified

according to the IUCN Global Ecosystem Typology 2.0[2] and the United Nations Decade on Ecosystem Restoration categorization. This includes human-dominated landscapes such as urban and mixed-use areas (IUCN, 2022). Methodologically, the Barometer is operationalized through eight indicators summarized in Graph 1.

Graph 1. Restoration Barometer Indicators

Action Indicators

1. Policies and Institutional Arrangements

Implemented for promoting, incentivizing, and triggering restoration.

2. Funding

Funds directed toward restoration by governments, businesses, international donors, and other entities.

3. Technical Planning

to determine where, how, and with whom restoration should take place.

4. Monitoring systems

Established monitoring systems to track the progress of restoration.

Impact Indicatores

5. Land Area Improved by Restoration

Area of land where functionality (the ability to provide ecosystem goods and services) has been enhanced through restoration.

6. Climate and Carbon Sequestration

Climate impact and forest carbon stored through restoration.

7. Biodiversity Benefits

Benefits to biodiversity, including how habitat creation or improvement benefits wildlife.

8. Economic Impact

Particularly the amount of employment generated

Source: Restoration Barometer, a guide for governments.

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Luis Eric Ecker/IUCN

2. Methodology

Through this exercise of synthesizing the results of the application of the Restoration Barometer in the countries, we seek to examine and summarize the results obtained in each participating country. The purpose is to highlight similarities, differences, and common patterns in terms of policies, planning, monitoring, funding, and impacts of restoration.

This analysis provides a comprehensive view of progress in the implementation of restoration in these three countries and identifies lessons learned and opportunities for future applications of the Barometer at both national and regional levels. The synthesis offers a comprehensive perspective that aims at contributing to informed decision–making in the field of ecosystem restoration.

The methodology used to prepare the synthesis was based on the following steps:

1. We conducted a documentary review of the methodological backgrounds and reports of the national applications of the Barometer. We also reviewed proceedings of the workshops held with national stakeholders involved in the application of the Barometer as well as documents about the design and implementation of the AFOLU initiative, particularly its MRV system. This provided a complete and detailed understanding of the processes and results achieved in each country (see references).

2. Based on the countries´ results and the structure of the Barometer Protocol, a proposed structure for a summary sheet was developed (see Annex 1 Summary Sheet Structure). The objective was to synthe–size, through a common structure, the main results of the Barometer applications in each country.

3. Using the adjusted content structure, three sum–mary sheets – one per country – were generated. These summary sheets provided a concise and consistent overview of the results obtained from the application of the Barometer in each country (see Annex 2 Summary Sheets: Results of the applica–tion of the Barometer in Guatemala, El Salvador, and Costa Rica.

4. Additionally, interviews and consultations with representatives of the IUCN technical team that accompanied the Barometer's application processes were conducted. These interviews and consultations filled gaps and provided additional information and perspectives on lessons learned and opportunities for future Baromter applications from the experts involved in the process.

5. Consultations with representatives of the CAC (Central American Agricultural Council) and CCAD (Central American Commission for Environment and Development) were held. We gathered their perspectives on the usefulness, added value, and potential use of the Restoration Barometer as a complement to MRV systems in the context of the regional initiative "Building Resilience in the SICA Region with a synergistic approach between mitigation and adaptation, focusing on the Agriculture, Forestry, and other Land Uses (AFOLU)" (see Annex 3 Consultations with representatives of CAC, CCAD, and FAO).

6. Based on the collected inputs, a draft comparative synthesis report was prepared. This draft was reviewed by representatives of the IUCN technical team involved in the application of the Barometer.

7. A final version of the synthesis report was prepared, incorporating feedback from the IUCN technical team.

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Through this exercise of synthesizing the results of the application of the Restoration Barometer in the countries, we seek to examine and summarize the results obtained in each participating country.

The purpose is to highlight similarities, differences, and common patterns in terms of policies, planning, monitoring, funding, and impacts of restoration.

3. Results

3.1 General context of restoration in the three countries considered in this study

Below is a summary of general data on the restoration context in the three countries considered in this study.

Table 1. Summary of General Data on the restoration contest in the three countries considered in this study

Contry	Guatemala	El Salvador	Costa Rica
Surface[1] (km²)	108,890	21,041	51,100
Population[2] (inhabitants)	17,357,890	6,336,392	5,180,830
GDP per cápita[3] (USD per inhabitant)	5,473.2	5,127.3	13,198.8
Number of Barometer application exercises to date	1	2[4]	1
Year of last Barometer application	2021	2021	2021
Period covered by the Barometer application report	2011–2020	2014–2021	2011–2020
Country's commitment to the Bonn Challenge and year	1,200,000 ha (11% of the total country's area)	1,000,000 ha (47.5% of the total country's area)	1,000,000 ha (19.6% of the total country's area)
Number of restored hectares	379,192 ha	278,908 ha	482,000 ha
Progress towards the country's Bonn Challenge goal	32%	28%	48%
Main actors in restoration in the country (by % of restored area)	INAB: 87% ARNPG: 6% ICC: 4%	Consejo Salvadoreño del Café: 24% MARN: 20% Gobernanza Política Departamental: 16% MAG: 14%	FONAFIFO: 69% SINAC: 12% FUNDECOR: 8%
Main restoration modalities implemented (by % of restored area)	Silviculture: 67% Planted forests: 23% Agroforestry: 7% Other: 3%	Agroforestry: 44% Land and water protection: 31% Natural regeneration: 13% Silviculture: 5% Other: 7%	Land and water protection: 64% Agroforestry: 11% Silviculture: 11% Planted forests: 10% Other: 4%

Source: Own elaboration.

1 https://datos.bancomundial.org/indicator/AG.SRF.TOTL.K2
2 https://datos.bancomundial.org/indicator/SP.POP.TOTL
3 https://datos.bancomundial.org/indicator/NY.GDP.PCAP.CD
4 2014–2017 & 2018–2019.

Review of the General Ecosystem Restoration Context

The following are some observations and comments derived from the review of the general ecosystem restoration context of the three countries considered in this study:

- All countries, except El Salvador, have conducted one application of the Barometer. El Salvador conducted 2 applications: one for the period 2014–2017 and another for the period 2018–2019. In 2021, the government of El Salvador conducted a partial application, updating the total number of restored hectares.

- The applications of Guatemala and Costa Rica cover the same time frame: 2011–2020 (10 years).

- The national goals committed to the Bonn Challenge by Guatemala, El Salvador, and Costa Rica are quite similar in extent, ranging from 1 million to 1.2 million hectares.

- El Salvador's Bonn Challenge goal represents 47.5% of the country's area; Costa Rica's is equivalent to

19.6% of its area, and Guatemala's is equivalent to 11%.

- In Guatemala and Costa Rica, the top 3 restoration actors contributed 80% (or more) of the total hectares restored during the periods covered in their respective reports (INAB, ARNPG, and ICC in Guatemala; FONAFIFO, SINAC, and FUNDECOR in Costa Rica).

- In the case of El Salvador, the four most important restoration actors contributed 74% of the total hectares restored between 2014–2019, namely the Consejo Salvadoreño de Café, MARN, Gobernanza Política Departamental, and MAG.

- In terms of total hectares restored, a government institution is the primary promoter/executor of restoration: INAB (National Forestry Institute) in Guatemala, Consejo Salvadoreño del Café in El Salvador, and FONAFIFO (National Forestry Financing Fund), in Costa Rica.

3.2 Synthesis of the Barometer Application Processes

This section provides an overview of the Barometer application processes in each country, including the institutions and entities involved in the data collection and validation process, a timeline, and the achieved results.

Luis Eric Ecker/IUCN

IUCN

Case Guatemala

Restoration governance

INAB has played a crucial role in the restoration of forest landscapes in the country. It is an autonomous and decentralized government entity responsible for forest management in the agricultural public sector.

INAB has chaired the "Restoration Table" in collaboration with IUCN since its establishment in 2012. This platform serves as a technical inter-institutional coordination body, composed of various sectors, including civil society, the private sector, academia, and communities.

Through this platform, its members and collaborators monitor information gathering efforts and provide inputs and guidance for decision-making.

Description of the methodological process

The Barometer was implemented in Guatemala with the participation of government institutions, private organizations, and NGOs. Information on restoration actions carried out by these organizations during the 2011–2020 period was compiled.

The baseline information was standardized following the typologies proposed by the Barometer for ecosystems and restoration actions.

The results were presented and validated in a workshop with representatives of participating organizations. Success factors, outcomes, and benefits were assessed, considering policies, plans, strategies, and progress in restored hectares. Additionally, financial analyses were conducted to evaluate employment generated, and estimates were made for carbon capture and biodiversity impacts due to restoration efforts.

Participating organizations

• Government Institutions: INAB, MAGA, CONAP, MARN.

• Private Sector: ICC, ANACAFE, GREPALMA.

• Civil Society Organizations: ARNPG, FDN, RA, WWF, FUNDAECO.

Sources of information used

Secondary information provided by participating organizations on their progress and results of the implementation of restoration actions during the 2011–2020 period.

Results report

Nello, T., Enriquez C., Putzey G. (2022). *Barómetro de la Restauración Medición de avances en Guatemala*. https://drive.google.com/file/d/1NVtiktvIPBd9vxgUaQ9H2vOHJaSg4UWX/view?usp=sharing

Pablo Arturo López Guijosa/IUCN

Case El Salvador

Restoration governance

MARN leads restoration actions in the country through the Directorate of Ecosystems and Biodiversity. This directorate is responsible for managing Natural Protected Areas and Biological Corridors, working closely with local actors such as farmers, forest owners, and communities. MARN implements the Ecosystems and Landscapes Restoration Program (PREP), which is supported by the National Council for Environmental Sustainability and Vulnerability (CONASAV). CONASAV has established the Ecosystem Restoration Table, an intersectoral advisory platform that coordinates restoration actions and convenes specific sectoral groups for dialogue.

Description of the methodological process

In 2018, MARN, with the support of IUCN, implemented the first application of the Barometer for the 2014–2017 period (Dave et al., 2019). To update progress in restoration, a second application of the Barometer for the 2018–2019 period was carried out. In both applications, the information collected by MARN, came from reports of organizations implementing restoration actions in the country. For the second application, the available information was standardized following the typologies proposed by the Barometer, and the results were presented and validated with representatives of participating organizations. The analysis included a review of the state of enabling conditions for restoration (legal framework, plans and strategies, planning, monitoring, and financing); achieved results (restored hectares); and their main impacts (employment, CO_2 capture, and biodiversity benefits). In 2021, El Salvador updated its report on restored areas up to 2021, based on its institutional efforts of annual monitoring of restoration in the country, demonstrating the government's commitment and ownership of the Barometer, as well as its capacity to keep information updated.

Participating organizations

- Government Institutions: MARN, MAG, FONAES, FIAES.

- Local Governments: La Montañona Consortium.

- Civil Society Organizations: PRISMA, FUNDE, CRS.

- Cooperation Organizations and Multilateral Agencies: GIZ, FAO, UN Environment.

Sources of information Used

- First Application (2014–2017): Database of restoration activities from the MARN's landscape and ecosystem restoration monitoring platform.

- Second Application (2018–2019): Database of the PREP's geo-compliance platform.

Results report

▪ Preparation of the report for the Bonn Barometer of Progress in El Salvador (2014–2017). https://drive.google.com/file/d/1ot29JFj5N6Q1_-FDx_0oXAUvfGB8RQRd/view?usp=sharing

▪ Update of the Bonn Challenge Barometer in El Salvador 2018–2019. https://drive.google.com/file/d/1ojqFRZJ_TrIB79JyXlCh1PsN4kZk298d/view

Tony Nello/IUCN

Case Costa Rica

Restoration Governance

In Costa Rica, ecosystem restoration has been led by MINAE, through its decentralized entities such as FONAFIFO and SINAC. The national–scale planning has been grounded in participatory and intersectoral processes since 2016, focusing on water resource protection (Raes et al., 2022). Currently, SINAC leads the ecosystem restoration planning and monitoring process, as outlined in Costa Rica's `National Landscape Restoration Strategy.

Description of the methodological process

The support of various key government institutions, municipal governments, associations, public enterprises, NGOs, and cooperation agencies was enlisted. These organizations shared information on their progress and results in implementing restoration actions between 2011 and 2020. The collected information was organized according to the Barometer's typology (classification of ecosystems and restoration actions) and was presented and validated in a workshop with representatives of participating organizations. The analysis included an estimation of restored hectares, progress in policies, plans, strategies, restoration planning, and monitoring. Additionally, a financial sources analysis was conducted, and the impacts of implemented restoration actions in the country were evaluated in terms of employment, carbon capture, and biodiversity benefits.

Sources of information used

Secondary information provided by participating organizations on their progress and results in implementing restoration actions during the 2011–2020 period.

Participating organizations

- Government Institutions: SINAC, FONAFIFO, MAG, REDD+ Secretariat; Icafe.
- Local Governments: Municipality of San Carlos, Municipality of Curridabat.
- Private Sector: CORBANA, CONARROZ, Nespresso.
- Public Enterprises: ICE, CNFL, ESPH, and AYA.
- Civil Society Organizations: FUNDECOR, CI, CATIE, ACRxS.
- Cooperation organizations and multilateral agencies: UNDP, GIZ.

Results report

Nello, T., Rivera, P. & Putzeys, G. (2023). *Application of the Restoration Barometer in Costa Rica: progress of ecosystem restoration from 2011 to 2020*. Gland, Switzerland: IUCN. https://portals.iucn.org/library/node/50737

Review of the Barometer application processes

Below are some elements derived from the review of the Barometer application processes in the three countries considered in this study:

- The restoration governance model is quite similar in all three countries. In all cases, a government institution leads the restoration efforts: INAB (Guatemala), MARN (El Salvador) and MINAE (Costa Rica) and is accompanied by other government institutions and (or civil society actors. The involvement of international cooperation actors and the private sector varied in each country (see details below).

- In terms of methodology, the three countries followed similar processes: they worked with secondary information from various sources (official, academic, and/or civil society organizations). These data were standardized using the Barometer typologies. Once the data were unified they were, processed through statistical, financial, and spatial analyses −as available− to estimate the total restored hectares and their economic, climatic, and biodiversity impacts. In all cases, these analyses were complemented with information regarding enabling conditions for restoration (policies and strategies, planning, monitoring, and financing of restoration).

- Validation workshops were conducted in all three countries with representatives of the main restoration actors in each country.

- In Guatemala, besides the government and civil society actors, we worked with representatives from the private sector (ICC and ANACAFE).

- In El Salvador, central and local government entities (municipalities) participated, as well as civil society and cooperation and multilateral agencies (GIZ, FAO, UN Environment).

- The Costa Rican experience achieved the broadest sectoral combination, including the participation of central and local government (municipalities), the private sector (banana and coffee), public water and energy utilities, civil society, and cooperation and multilateral agencies (UNDP and GIZ).

- In all cases, final results reports were generated. They presented in a clear and orderly manner the main findings of the Barometer application process in each country.

3.3 Synthesis of results from Barometer applications

This section summarizes the results of the Barometer application in each country following the Barometer protocol's structure, which groups 8 main indicators into two broad categories: (i) action indicators; and (ii) impact indicators.

3.3.1 Action indicators

The following are the Barometer's action indicators related to the enabling conditions for restoration in each country, including policy issues and institutional arrangements, available funding, planning and monitoring systems.

Indicator 1: Policies and institutional arrangements

Variable 1.1   Existing policies, plans, strategies related to restoration issues

The three countries report a diversity of institutions, policies, plans, and strategies with national and thematic coverage, addressing restoration issues directly and indirectly. The tables 2, 3, 4 summarize the reported instruments for each country.

Table 2. Key policy instruments for restoration in Guatemala

Guatemala	
Instrument Name	**Typology**
Instituto Nacional de Bosques (INAB)	Institution
Consejo Nacional de Áreas Protegidas (CONAP)	Institution
Ministerio de Ambiente y Recursos Naturales (MARN)	Institution
Ministerio de Agricultura, Ganadería y Alimentación (MAGA)	Institution
Probosque Law (2015)	Law
National Biodiversity Policy and Strategy and Action Plan 2012–2022	Policy
Policy for the Comprehensive Management of Guatemala's Marine Coastal Zones (2009)	Policy
Agricultural Policy 2016–2020 (2016)	Policy
Rural Development Policy, PNDRI (2009)	Policy
National Low Greenhouse Gas Emission Development Strategy (2016)	Strategy
National Strategy for Forest Landscape Restoration (Decree 2015–2045)	Strategy
Regulation for the Management of Mangrove Ecosystem Forest Resources (2019)	Regulation
National Climate Change Action Plan, PANCC (2019)	Plan
Plan for the Reduction of Vulnerability and Impacts of Climate Change on Biodiversity and Ecosystem Services on the Pacific Coast of Guatemala.	Plan

Source: Own elaboration.

Table 3. Key policy instruments for restoration in El Salvador

El Salvador	
Instrument Name	**Typology**
Ministerio de Medio Ambiente y Recursos Naturales de El Salvador (MARN)	Institution
Ministerio de Agricultura y Ganadería (MAG)	Institution
Fondo de Inversión Ambiental de El Salvador (FIAES)	Institution
Forest Policy of El Salvador 2016–2036	Policy
Climate Change Policy for the Agricultural and Forestry Sector (2017)	Policy
Institutional Strategic Plan 2014–2019 MARN (Ministry of Environment and Natural Resources)	Strategic Plan
Institutional Strategic Plan 2020–2024 MARN (Ministry of Environment and Natural Resources)	Strategic Plan
Institutional Strategic Plan 2014–2019 MAG (Ministry of Agriculture and Livestock)	Strategic Plan
National Biodiversity Strategy (2013)	Strategy
Forest Strategy of El Salvador (2006)	Strategy
National Strategy for Watershed Management (2017)	Strategy
Action Plan for Ecosystem and Landscape Restoration 2018–2022	Plan
Sustainable Plan of El Salvador	Plan
United Nations Decade on Ecosystem Restoration 2021–2030	Plan
Bill "Incentives for Agroforestry Systems of Coffee in El Salvador"	Bill (Legislative proposal)

Source: Own elaboration.

Table 4. Key policy instruments for restoration in Costa Rica

Costa Rica	
Instrument Name	**Typology**
Sistema Nacional de Áreas de Conservación (SINAC)	Institution
Ministerio de Ambiente y Energía (MINAE)	Institution
Ministerio de Agricultura y Ganadería (MAG)	Institution
Dirección de Cambio Climático (DCC)	Institution
Forest Law No. 7575, Article 22 (Payment for Environmental Services)	Law
National Climate Change Adaptation Policy of Costa Rica 2018–2030	Policy
National Policy for the Protection of Rivers, Streams, Creeks, and Springs	Policy
National 5R Landscape Restoration Strategy 2021–2050	Strategy
National Biodiversity Strategy 2016–2025	Strategy
Low Carbon Livestock Strategy (NAMA Livestock)	Strategy
Strategy and Action Plan for the Adaptation of the Biodiversity Sector to Climate Change	Strategy
REDD+ Strategy	Strategy
National Decarbonization Plan 2018–2050	Plan
Interinstitutional Cooperation Agreement between MINAE and MAG for the Development of Comprehensive Farms (CV-01-2019-AJ-MAG)	Agreement

Source: Own elaboration.

Indicator 2: Funding

Variable 2.1, 2.2, 2.3, and 2.4. Public funds, private sector funds, international cooperation funds, philanthropy, and civil society funds invested in restoration

- It is estimated that USD 1,385 million is the funding mobilized for restoration in the three countries during 2011–2020. Of this total, 43% corresponds to Guatemala, 36% to Costa Rica, and 21% to El Salvador. Graph 2 illustrates the distribution of the total amount among the three countries.

- Each country presents a particular composition of funding sources (depending on the origin of resources). Graph 3 illustrates how the total amount mobilized is distributed by each country (data is presented as percentages to facilitate interpretation given the disparities in scale between investments made in each country).

- Taking into account the hectares restored in each country, as well as the number of years covered by their reports, it is possible to estimate *the average annual investment per hectare restored* made by each country in their restoration interventions. Graph 4 illustrates these values.

❞

USD 1,385 million is the funding mobilized for restoration in the three countries during 2011–2020.

Graph 2. Distribution among countries of the total reported financing for restoration actions implemented between 2011–2022 (amounts in millions of USD)

Guatemala, USD 602 mill.

Costa Rica, USD 497 mill.

El Salvador, USD 287 mill.
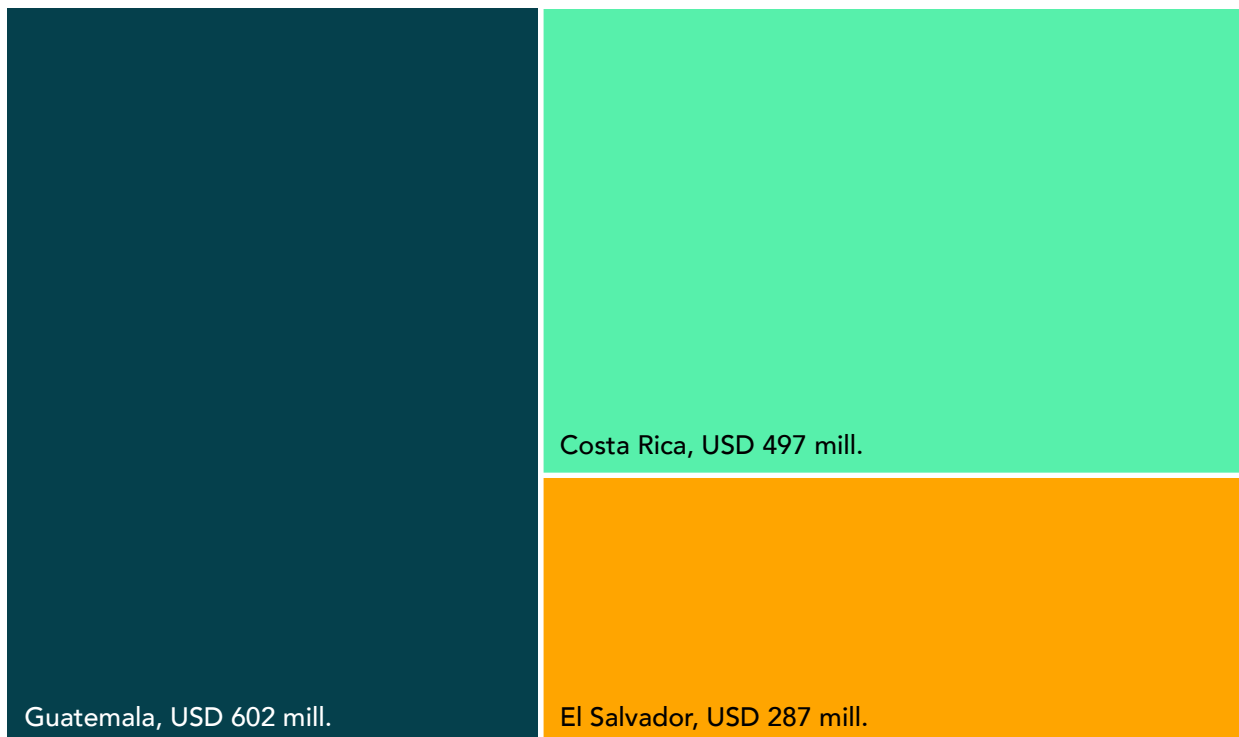
Source: Own elaboration.

Graph 3. Investment in restoration per country per hectare, per year: origin of funds
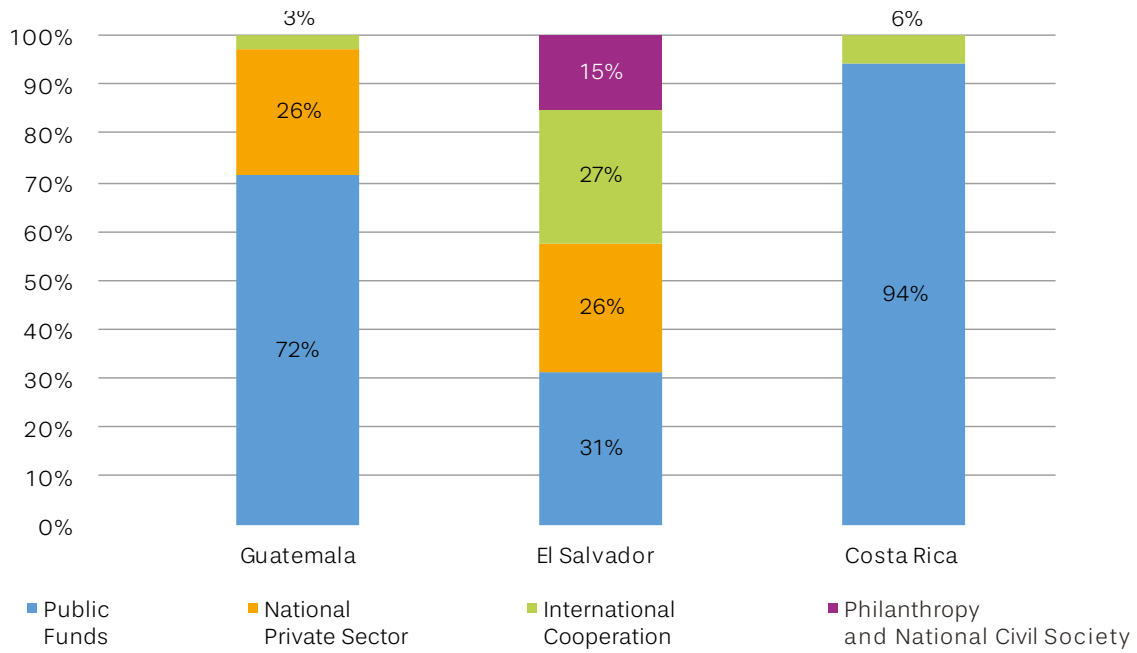
Source: Own elaboration.

Graph 4. Investment in restoration actions per country per hectare restored per year
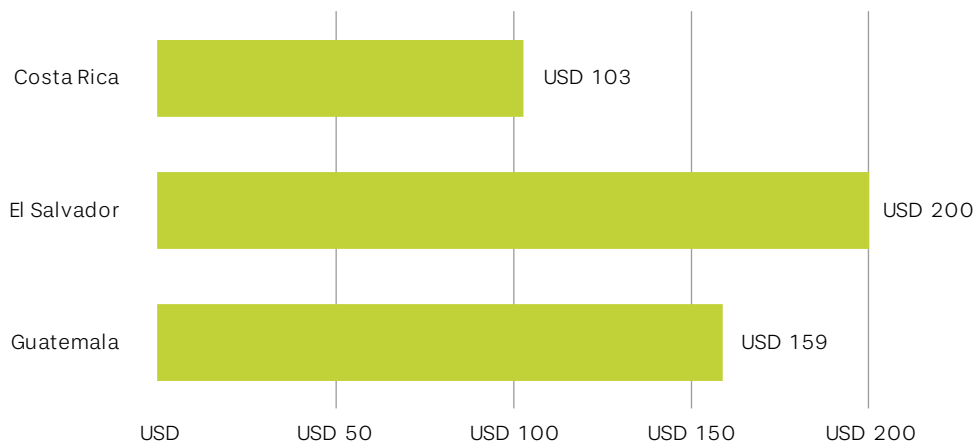
Source: Own elaboration.

Variable 2.5   Distribution of financing by type of restoration intervention

▪ Additionally, Guatemala and Costa Rica reported the distribution of its investment in restoration by restoration modality. El Salvador did so based on the types of ecosystems to which the funds were allocated. Table 5 summarizes these data.

Table 5. Distribution of funds invested in restoration by modality and type of ecosystem

Guatemala	
Restoration modality	**Distribution of funds invested in restoration**
Planted forests and shrub cover	60%
Silviculture	22%
Agroforestry	9%
Natural regeneration	8%
Other modalities	1%
El Salvador	
Ecosistem type	**Distribution of funds invested in restoration**
Forest ecosystems	33%
Agricultural ecosystems	67%
Costa Rica	
Restoration modality	**Distribution of funds invested in restoration**
Planted forests and shrub cover	60%
Silviculture	22%
Natural regeneration	8%
Agroforestry	8%
Other modalities	2%

Source Own elaboration.

Indicator 3: Technical planning

Variable 3.1   Restoration planning exercises

▪ Guatemala, El Salvador, and Costa Rica reported several restoration planning exercises –at different scales– that took place during their respective reporting periods. Several of these exercises are currently ongoing. Tables 6, 7 and 8 summarize the reported exercises/initiatives in each country.

Table 6. Restoration planning exercises in Guatemala

Guatemala			
Metodology	**Scope /Focus**	**Year**	**Detail**
1. Restoration Opportunities Assessment Methodology (ROAM)	National	2017	Planning and prioritization of restoration actions in the country.
2. Water Security Program for the Metropolitan Region of Guatemala (PROSEHIGUA)	Valley of Guatemala City	2018	Prioritization of agricultural spaces to be restored in the Metropolitan Region.
3. ROAM Green Climate Fund and KOICA–IUCN.	Highlands	2021	Planning for restoration with an integrated wa–tershed management approach.

Source: Own elaboration.

Table 7. Restoration planning exercises in El Salvador

El Salvador			
Metodology	**Scope /Focus**	**Year**	**Detail**
1. Restoration Opportunities Assessment Methodology (ROAM)	National	2017	Planning and prioritization of restoration actions in the country.
2. REDD+	Landscapes	2018	Landscape planning methodology applied in pilot areas.
3. Local Sustainable Development Plans (LSDPs)	Local	2016–present	Local–level planning tool within the REDD+ approach and implemented by FIAES in restora–tion initiatives.

Source: Own elaboration.

Table 8. Restoration planning exercises in Costa Rica

Costa Rica			
Metodology	**Scope / Focus**	**Year**	**Detal**
1. (ROAM) Metodology in Costa Rica	Agricultural lands, protected areas, grasslands, degraded forests.	2017	Expert panel to agree on opportunities, priorities, and restoration activities.
2. NAMA Coffee	Agricultural lands	2011	Sectoral effort to assess, pilot, and expand practices supporting mitigation and adaptation in the coffee sector.
3. NAMA Livestock	Agricultural lands	2013	Sectoral effort to assess, pilot, and expand practices supporting mitigation and adaptation in the livestock sector.
4. NAMA Musaceae	Agricultural lands	2022	Sectoral effort to assess, pilot, and expand practices supporting mitigation and adaptation in the banana sector.
5. NAMA Sugarcane	Agricultural lands	2022	Sectoral effort to assess, pilot, and expand practices supporting mitigation and adaptation in the sugarcane sector.
6. NAMA Rice	Agricultural lands	2022	Sectoral effort to assess, pilot, and expand practices supporting mitigation and adaptation in the rice sector.
7. National Urban–Environment Agenda	Urban	2021	Pilot project between FUNDECOR and FONAFIFO to finance 200 to 500 hectares annually in reforestation plans.
8. Agro–Environmental Agenda	Agricultural lands, protected areas, grasslands, degraded forests	2016	Identification, transfer, and adoption of practices and technologies for integrated landscape management.

Source: Own elaboration.

Indicador 4: Monitoring systems

Variable 4.1   Operational restoration monitoring systems

- Guatemala, El Salvador, and Costa Rica reported several monitoring systems that operated at different scales and were managed by different administrators during the corresponding reporting period. The tables 9, 10 and 11 summarize the monitoring systems by country.

Table 9. Restoration monitoring systems in Guatemala

Guatemala		
System name	**Scope**	**Administrator**
1. SNICC – National Climate Change Information System	National	MARN
2. Forest Landscape Restoration Monitoring Platform	Local /National	INAB
3. Forest Monitoring system for Forest Incentives 1998–2020	National	INAB
4. FDV Restoration Costa Sur GIZ	Local and departmental in 3 departments of the South Coast	RA (Rainforest Alliance)
5. Virtual Platform, recording conservation and restoration actions.	Metropolitan Area	FUNCAGUA

Source: Own elaboration.

Table 10. Restoration monitoring systems in El Salvador

El Salvador		
System name	**Scope**	**Administrator**
1. PREP Monitoring Platform	National	MARN
2. Sustainability Index for Landscape Restoration	National	PRISMA
3. National Forest Monitoring System	National	MARN
4. Ecosystem Services Index	Subnational	REDD+ landscapes program
5. Monitoring and Reporting System for the Progress in the Implementation of El Salvador's Nationally Determined Con–tributions (NDCs).	National	FIIAPP

Source: Own elaboration.

Table 11. Restoration monitoring systems in Costa Rica

Costa Rica		
System name	**Scope**	**Administrator**
1. SIMOCUTE – Land Cover and Ecosystem Monitoring System	National	CENIGA
2. REDD+ Monitoring System	National	REDD+ Secretariat (FONAFIFO/SINAC)
3. Payment for Environmental Services Monitoring	National	FONAFIFO
4. NAMA Coffee	National	MAG/Icafé
5. NAMA Livestock	National	MAG/CORFOGA
6. SINAMECC (Plan A, municipal–level monitoring of climate change actions)	Nacional–Subnational	DCC
7. Voluntary Forest Regime Project Registryo	National	SINAC
8. Forest Type Map 2021	National	SINAC

Source: Own elaboration.

**Comparative review of action indicators
from Barometer applications**

Below are some observations and comments derived from the review of action indicators from Barometer applications in the three countries considered in this study.

Regarding Indicator 1:
Policies and institutional arrangements

- The Barometer application processes in each country did not include an assessment of the relevance, significance, and/or sufficiency of their respective policy frameworks and institutional arrangements; instead, they focused on describing them.

- For the three countries considered, there is a wide variety of institutions, policies, laws, strategies, programs, regulations, plans, and agreements related to restoration.

IUCN

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Regarding Indicator 2:
Funding

- When estimating the annual investment per hectare restored, it is possible to eliminate scale factors and differences in reporting periods, thus obtaining comparable data. Estimates show that El Salvador made the highest annual investment per hectare (USD 200), followed by Guatemala (USD 159), and Costa Rica (USD 103).

- Regarding the source of mobilized financing, in the case of Costa Rica, the majority of the resources came from public funds (94%) with a supplementary contribution from international cooperation (6%).

- In Guatemala, funds came from three sources: public funds (72%), private sector (26%), and international cooperation (3%).

- El Salvador shows the most diverse composition of funding sources, combining four of them: public funds (31%), international cooperation (27%), private sector (26%), and philanthropy and national civil society (15%).

- In all cases, the majority of mobilized financing came from public funds.

- In all cases, there is some degree of participation from international cooperation.

- In the cases of Guatemala and El Salvador, there is participation from the private sector.

- Only in El Salvador there is evidence of philanthropic participation. Contributions from national civil society organizations were recorded in the cases of El Salvador and Costa Rica.

Regarding Indicator 3: Technical planning

- The three countries report multiple exercises of national–level technical restoration planning (3 in Guatemala and El Salvador; 8 en Costa Rica). In the case of Costa Rica, several sectoral planning exercises were carried out (in sugarcane, coffee, banana, rice, among others). This sectoral planning approach for restoration could be relevant for other countries, as well as for the regional perspective of ecosystem restoration within the AFOLU 2040 framework.

-

- It should be noted that, before using the Barometer, the three countries conducted national–level applications of the Restoration Opportunities Assessment Methodology (ROAM). These exercises allowed to define their geographic priorities for restoration actions under the Forest Landscape Restoration approach on different types of soil, including those with productive uses.

IUCN

Regarding Indicator 4: Monitoring systems

IUCN

- All countries reported several systems with local and national coverage (5 in Guatemala and El Salvador; 9 in Costa Rica).

3.3.2 Impact indicators

The impact indicators of the Barometer highlight results related to restored areas (also linked to progress in achieving the goals set in each country's commitments) and impacts on climate, biodiversity, and the economy.

Indicator 5: Land

Variable 5.1 Number of restored hectares

▪ For between 2011 and 2020, the three countries reported the total restoration of 1,140,100 ha, representing 36% of the combined Bonn Challenge target (3,200,000 ha), which is equivalent to 17.7% of the total area of the three countries. This represents an approximate annual average of 3.6% towards the 2030 combined restoration goal.

Graph 5. Total number of restored hectares and progress in achieving the Bonn Challenge target in Guatemala, El Salvador, and Costa Rica between 2011 and 2020*

Countries: Guatemala, El Salvador and Costa Rica
Total restored ha: 1,140,100
Period: 2011–2020
Bonn Target Progress: 36% (~3.6% per year)
Bonn Target : 3,200,000 ha (3.6% of total extension)

36%
(~3,6% annual)
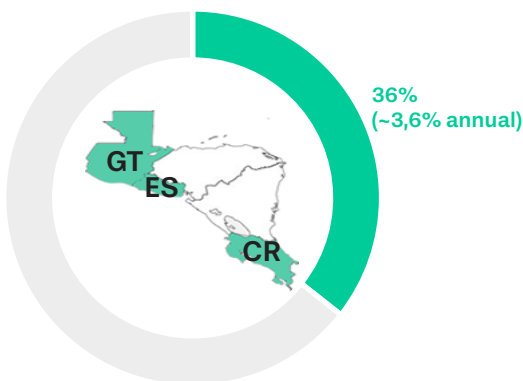
Source: Own elaboration.

* The gray–shaded portion of the graph represents the percentage of hectares yet to be restored to achieve the combined Bonn Challenge target for the three countries.

▪ For the period 2011–2020, **Guatemala** reported the restoration of **379,192 hectares**, equivalent to **32%** of its Bonn Challenge goal (1,200,000 hectares, representing 11% of the total country's area). This corresponds to an average annual progress of approximately 3.2% towards its 2030 restoration goal.

Graph 6. Number of hectares restored and progress towards the Bonn Challenge goal in Guatemala, El Salvador, and Costa Rica between 2011–2020*

32%
(~3,2% annual)

Total restored ha: 379,192
Period: 2011–2020
Bonn Target progress: 32% (~3.2% annual)
Bonn Target: 1,200,000 ha (11% of total extension)

28%
(~3,5% annual)

Total restored ha: 278,908
Period: 2014–2021
Bonn Target progress: 28% (~4% annual)
Bonn Target: 1 200,000 ha (47.5% of total extension)

48%
(~4,8% annual)

Total restored ha: 482,000
Period: 2011–2020
Bonn Target progress: 48% (~4.8% annual)
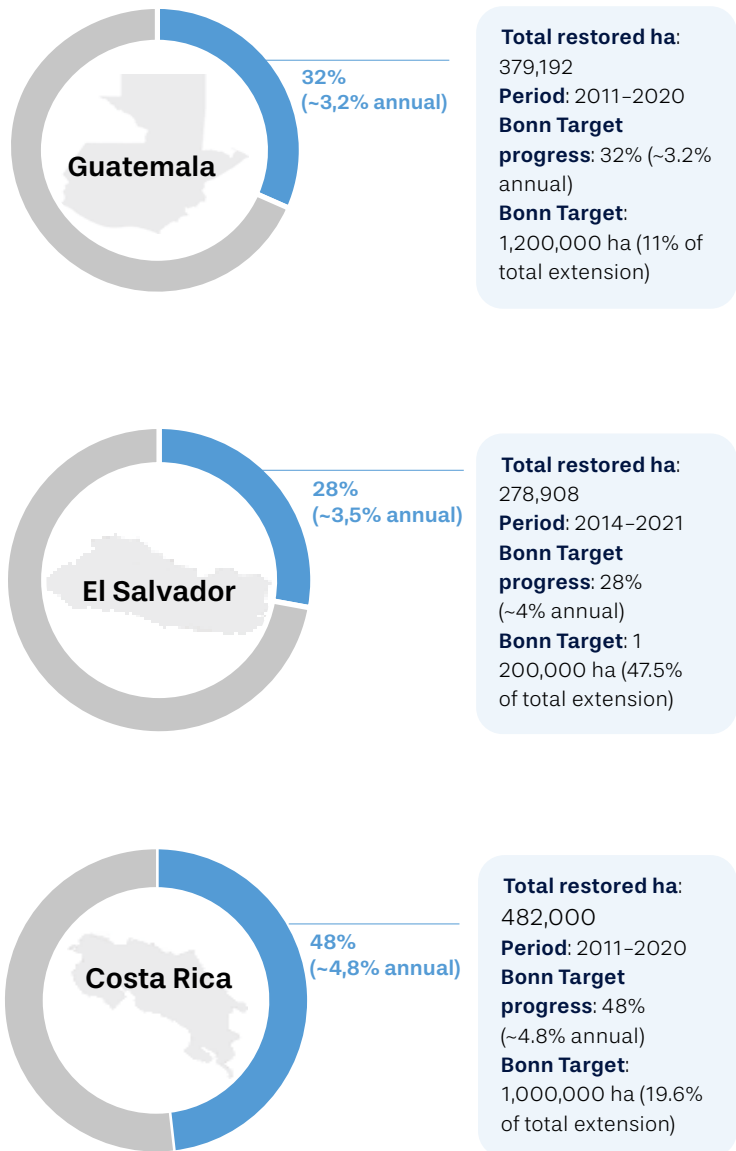**Bonn Target**: 1,000,000 ha (19.6% of total extension)

Source: Own elaboration.

* The portions of the graphs in gray represent the percentage of hectares yet to be restored to achieve each country's Bonn Challenge goal.

- For the period 2014–2021, **El Salvador** reported the restoration of **278,908 hectares**, equivalent to **28%** of its Bonn Challenge goal (1,000,000 hectares, representing 47.5% of the total country's area). This corresponds to an average annual progress of approximately 3.5% towards its 2030 restoration goal.

- For the period 2011–2020, **Costa Rica** reported the restoration of **482,000 hectares**, equivalent to **48%** of its Bonn Challenge goal (1,000,000 hectares, representing 19.6% of the total country's area). This corresponds to an average annual progress of approximately 4.8% towards its 2030 restoration goal.

- Taking into account the 2030 goals of the Bonn Challenge and the number of years considered in the countries´reports, it is observed that, Guatemala may reach 64% of the 2030 target (if conditions and rate of progress are maintained). Under the same considerations, Costa Rica and El Salvador would reach 96% and 64% of 2030 goal.

- To achieve 100% of their 2030 goal, the three countries would need to increase the speed of their restoration actions. Guatemala at 6.8% per year or 82,080 ha per year during 2020–2030. El Salvador at 8.6% per year or 80,121 ha per year during 2021–2030. Costa Rica at 5.2% per year or 51,800 ha per year between 2020–2030.

- Based on the rate of progress reported by the countries, the necessary acceleration rate for Guatemala would be 113% (moving from a 3.2% to 6.8% annual progress rate), 129% for El Salvador (moving from 3.5% to 8% of annual progress rate), and 8.3% for Costa Rica (moving from 4.8% to 5.2% of annual progress rate).

Graph 7. Countries current (2020–2021) and projected* (2030) progress towards achieving the Bonn Challenge Goals
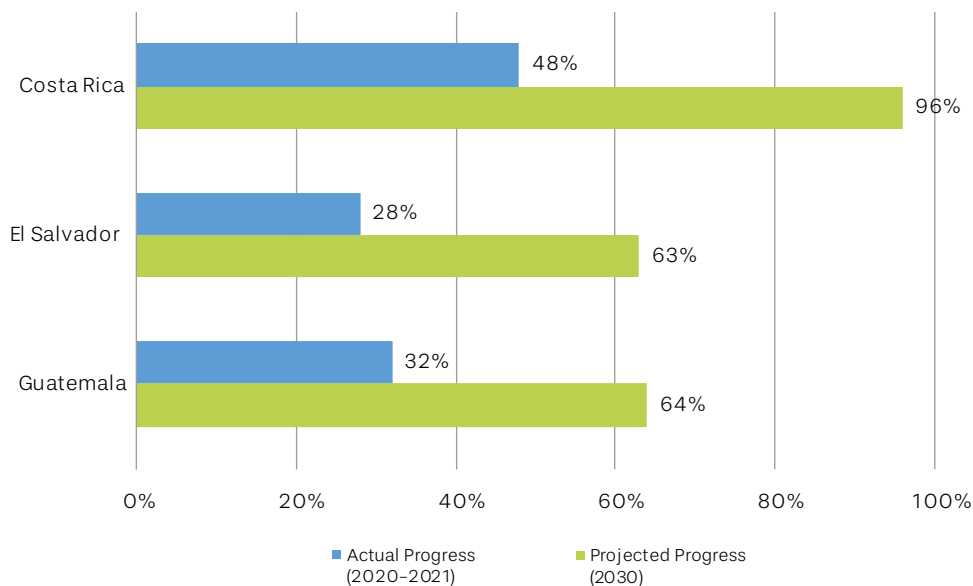
Source: Own elaboration.

*Assuming the conditions and pace of progress from the past decade remain constant.

Variable 5.2   Number of hectares restored by restoration modality or ecosystem type

Graph 8a illustrates the countries aggregated distribution of the restored hectares by restoration modality.

In the three countries, four restoration modalities account for 92% of the total restored areas: 39% for water and land protection)conservation actions), 27% for silviculture, 17% for improved land management and 9% for planted forests and groves. More than half of the restored areas (66%) correspond to two modalities: **water and land protection – conservation actions (39%) and silviculture (27%).**

Graph 8a. Distribution of hectares restored by restoration modality (data aggregated for the three countries considered in this study)
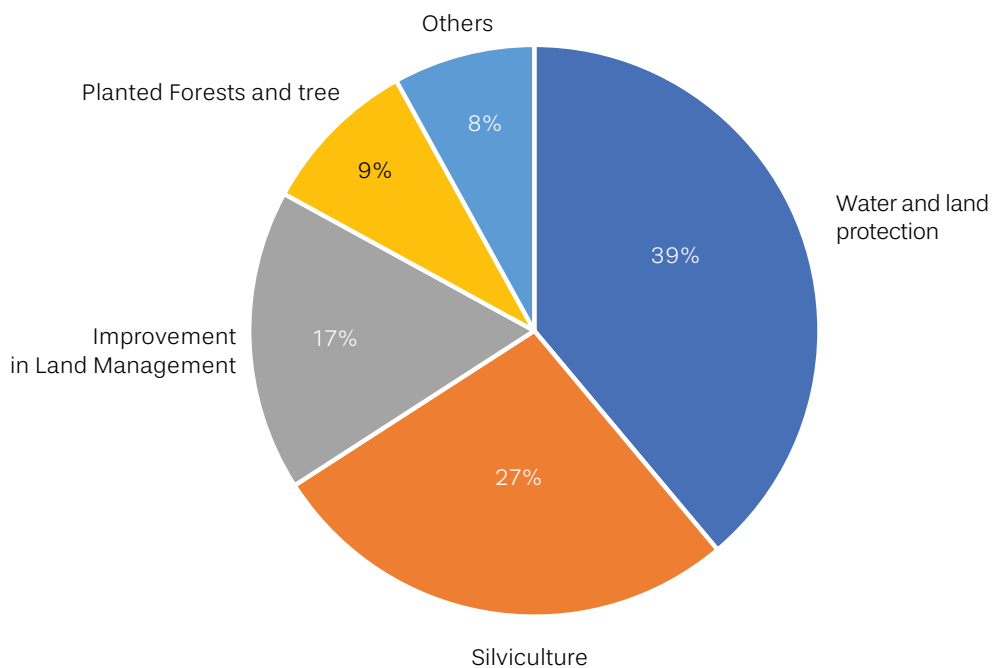
Source: Own elaboration.

Graph 8b depicts the disaggregated distribution for the three countries of the hectares restored by restoration modality.

Gráfico 8b. Disaggregated data for restored hectares by restoration modality, per country
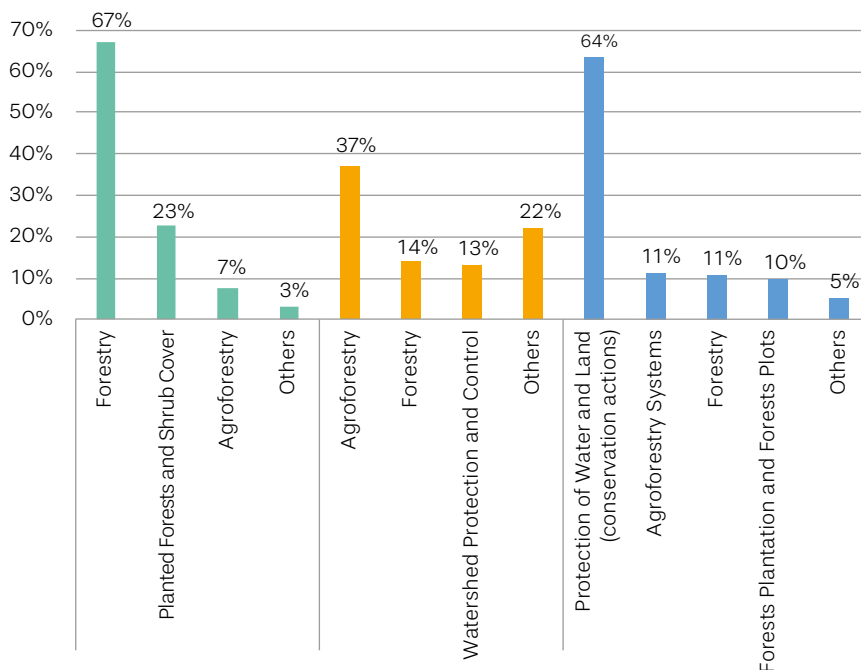
Guatemala

- **Three restoration modalities** cover **97%** of the total restored hectares:
  - Silviculture: 67%.
  - Forest plantation and forest plots: 23%.
  - Agroforestry systems: 7%.

El Salvador

- **Four intervention modalities** account for **86%** of the total restored hectares:
  - Agroforestry systems: 37%.
  - Silviculture: 14%s.
  - Watershed protection: 13%.
  - Other modalities*: 22%.

Costa Rica

- **Four intervention modalities** account for **95%** of the total restored hectares:
  - Land and water protection: 63.5%.
  - Agroforestry systems: 11%.
  - Silviculture: 11%.
  - Forest plantation and forest plots: 10%.

Source: Own elaboration.

* The 2020 report from El Salvador does not specify what is included within the category of "other modalities."

☀ Indicator 6: Climate

Variable 6.1 CO$_2$ Capture

- It is estimated that the restoration actions recorded in the three countries will allow for the sequestration of approximately 12 million tons of CO$_2$e (Graph 9).

Based on the data reported by the countries, significant differences are observed, due to the diverse restoration modalities implemented and their carbon capture potential. Additionally, besides estimating the carbon capture potential, some countries also assessed the mitigation of greenhouse gas (GHG) emissions related to ecosystem restoration actions implemented in each case.

As detailed in the table below, estimates regarding the impact of restoration on climate change mitigation depend on the progress in establishing deforestation and forest degradation baseline levels, as well as the implementation of greenhouse gas inventory systems.

For example, Costa Rica reported data that was used within the REDD+ framework and for the UNFCCC NAMAs reports. In contrast, El Salvador and Guatemala employed a globally recognized generic methodology to assess GHG balances in the AFOLU sector (Ex–ACT).

The methodologies used in each case are detailed in Graph 9.

Graph 9. Contributions to CO$_2$ capture as a result of restoration efforts between 2011–2020

506 285 TCO$_2$eq
6% of the total

El Salvador
1 508 714 TCO$_2$eq
19% of the total

Guatemala
6 061 300 TCO$_2$eq
75% of the total
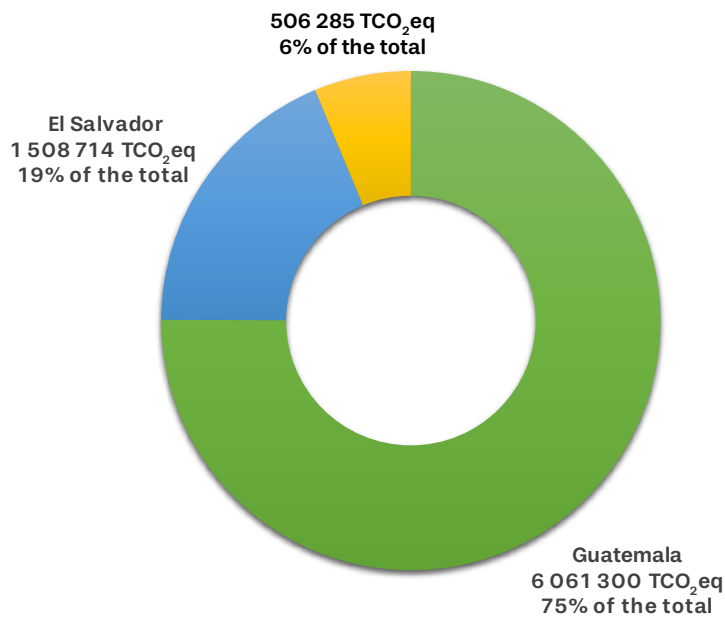
Source: Own elaboration.

Table 12. Carbon estimation methodologies used in the applications of the Barometer in the three countries considered in this study

Country	Carbon estimation methodology used	Carbon reservoir, and sources of emissions considered	Confidence level[1] (reported on the barometer)	Does this estimation contribute to national greenhouse gas inventories and/or the preparation of national reports to the UNFCCC?
Costa Rica	The emission factors and associated activity data used correspond to the reference levels established within the REDD+ framework[2] to assess the increase in carbon stored in forested and regenerated areas. We also used the records of the Livestock and Coffee NAMA (Nationally Appropriate Mitigation Action) which reported the contribution of agricultural ecosystem restoration, ensuring coherence with the information reported to the UNFCCC (United Nations Framework Convention on Climate Change).	Above-ground biomass, below-ground biomass, deadwood, litter, soil organic carbon, N_2O emissions, and methane.	Level 2 and 3	Yes
El Salvador	The EX-ACT v8.6.1 tool was used[3] to input activity data based on the restoration records from the MARN (Ministry of Environment and Natural Resources).	Above-ground biomass, below-ground biomass, deadwood, litter, soil organic carbon, N_2O emissions, and methane.	Level 1	No
Guatemala	The EX-ACT v9.1 tool was used to input activity data based on the restoration records from INAB (National Forestry Institute)	Above-ground biomass, below-ground biomass, deadwood, litter, soil organic carbon, N_2O emissions, and methane.	Level 1	No

Source: Own elaboration.

1. According to the barometer protocol, confidence levels are as follows: 1 The values provide low confidence in accuracy, as they are derived from non-spatial data and general estimates with limited supporting documentation or on-site validation. 2 The values offer moderate confidence in accuracy, derived from maps, surveys, and other statistical data with some supporting documentation and on-site validation. 3 – The values are associated with high confidence in accuracy, derived from spatially explicit data supported by adequate documentation and on-site validation.
2. See Technical annex https://unfccc.int/sites/default/files/resource/4863_3_iba-2019-anexotecnico_Edited.pdf
3. "Excel-based program that estimates emissions and absorptions from land use and land-use changes. It compares project scenarios to provide information on management practices and quantifies greenhouse gas impacts across multiple sectoral activities (e.g., livestock emissions and CO2 sequestration from tree planting for net impact). Available at:" https://www.fao.org/in-action/epic/ex-act-tool/suite-of-tools/ex-act/en/

Indicator 7: Biodiversity

Variable 7.1 Hectares restored in key biodiversity areas (KBA), protected areas (PA), and/or biological corridors (BC)

▪ On average, 21% of the restored areas in the three countries are located in protected areas (PA), while 29% are found in Key Biodiversity Areas (KBA).

▪ In the specific case of El Salvador, 35% of the restored areas are situated in biological corridors, a modality prioritized in its strategy for conservation and management of ecosystem services. Graph 10 shows the detailed distribution for each country.

Variable 7.2 Creation or improvement of existing habitats for species on the Red List

▪ The IUCN Red List is the most comprehensive global database on the conservation status of animal, fungal, and plant species. It is a key indicator of the overall health of biodiversity worldwide. As a complementary way to record the positive impacts of restoration on biodiversity, Costa Rica has reported on the status of species on the Red List that could benefit from implemented restoration initiatives.

Graph 10. Distribution of restored areas based on their location: Protected Areas (PA) and Key Biodiversity Areas (KBA)*

Costa Rica — Protected Areas 22%, Key Biodiversity Areas 50%

El Salvador — Protected Areas 9%, Key Biodiversity Areas 25%

Guatemala — Protected Areas 31%, Key Biodiversity Areas 12%
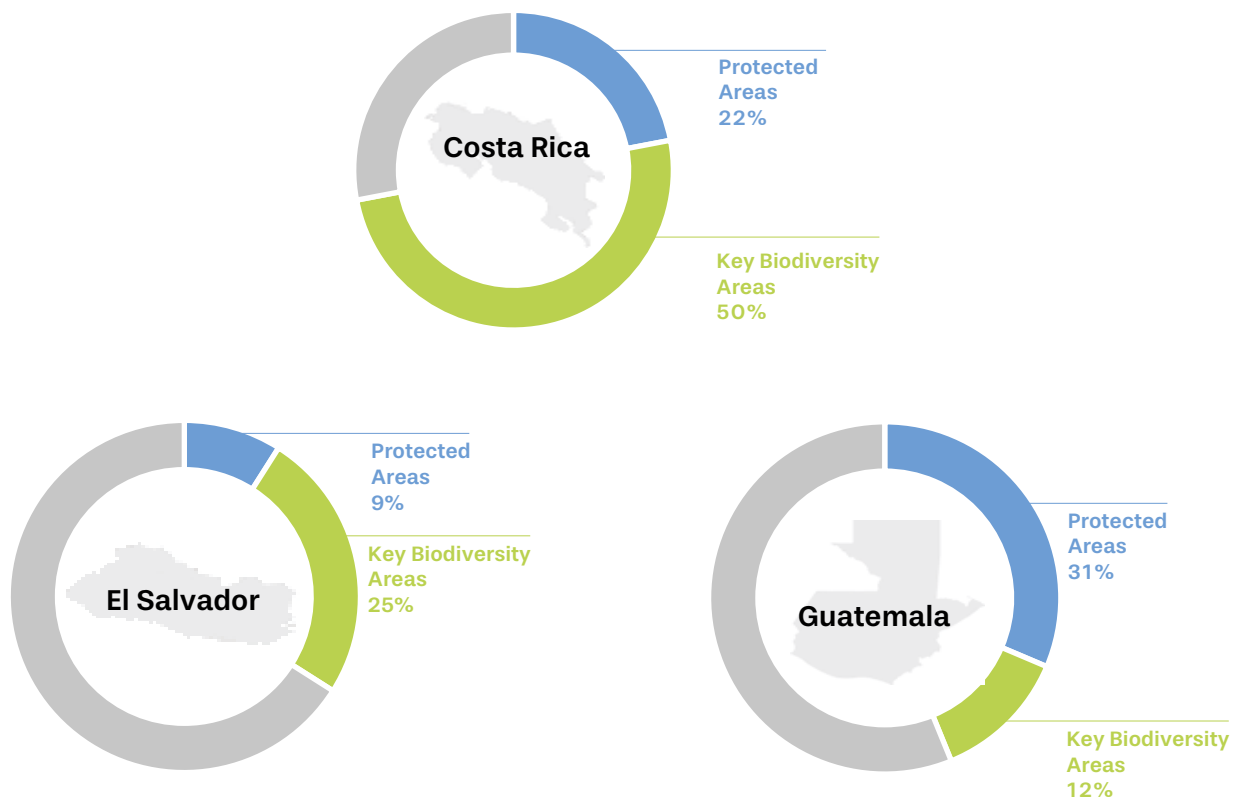
Source: Own elaboration.

* The portion of the graph in gray corresponds, in all countries, to restored areas not located in Key Biodiversity Areas or Protected Areas.

Costa Rica

- Of the total number of species on the IUCN Red List, 2005 species are estimated to be found within the areas of influence of the restoration actions implemented. Eighty–one species (4%) are in danger of extinction.

- Estimates indicate that regeneration actions may benefit 1,169 species (58% of the total) on the Red List (60 of them endangered).

- Silviculture has benefited 836 species – 42% of the total number of species on the Red List (21% of endangered species).

- Of the total number of species of the Red List that benefited from restoration actions, the biggest

- taxonomic group (1,093 birds, equivalent to 55% of the total species).

- The most threatened taxonomic group that could have benefited from restoration is amphibians (37 endangered).

Alouatta palliata. Photo: Luis Eric Ecker/IUCN.

Crocodylus acutus. Photo: Luis Eric Ecker/IUCN.

Ateles geoffroyi. Photo: Sean Southey/IUCN.
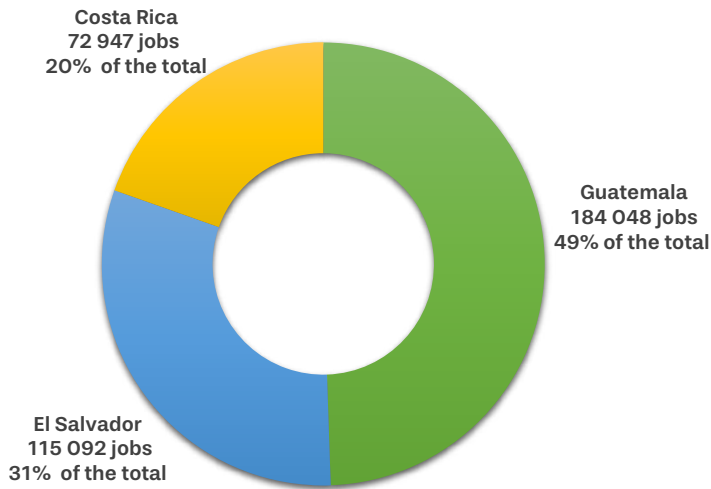

Crax rubra. Photo: Pablo Arturo López Guijosa/IUCN.

Indicator 8: Economy

Variables 8.1 and 8.2   Number of short, medium, and long-term jobs

- It is estimated that restoration actions implemented in the three countries during 2011–2020 generated approximately **372,000 new jobs**: 50% correspond to short-term jobs and 50% to medium-term jobs. The generation of short and medium-term jobs is due to the high labor demand required for the establishment of areas for restoration. Graph 11 shows the contributions of each country.

Graph 11. Contributions of the three countries to the generation of new jobs as a result of restoration actions implemented during 2011–2020

Costa Rica
72 947 jobs
20% of the total

Guatemala
184 048 jobs
49% of the total

El Salvador
115 092 jobs
31% of the total

Source: Own elaboration.

Variable 8.3   Jobs generated by restoration modality

- Graph 12 summarizes the distribution of new jobs generated, according to the restoration modalities. It is based on the four restoration modalities that generated the most jobs.

Graph 12. Distribution of jobs generated in the three countries by restoration modality (considering the 4 modalities that generated the most jobs)

Silviculture

20%

Natural regeneration   11%   32%   Agroforestry

30%

Planted Forests
Shrub Cover
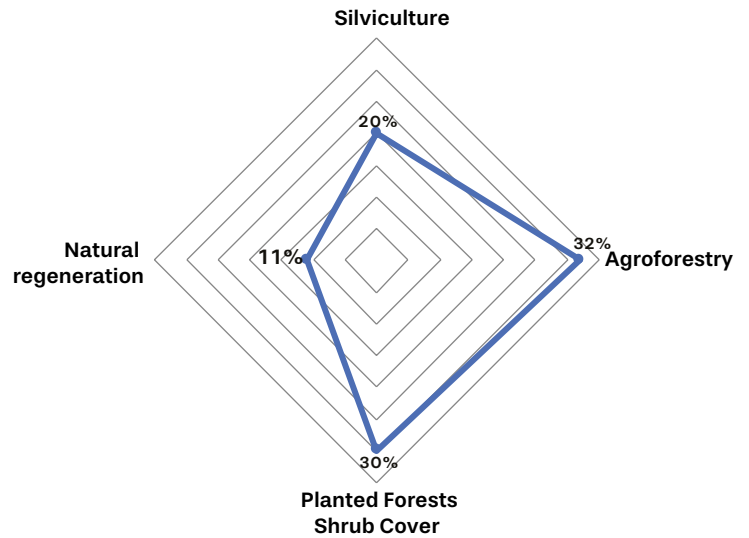
Source: Own elaboration.

- Graph 13 shows the distribution of jobs generated by restoration modality in each country. These profiles allow inferences about the restoration modalities identified in Variable 5.2, also associated with the intensity of labor use. For example agroforestry, which is driven by the agriculture sector stands out in El Salvador, since it is labor intensive. In the other countries, silviculture plays a more prominent role in job generation. The following graph illustrates the distribution of jobs according to the restoration modality for each country.

In Guatemala and Costa Rica, the practices of "artificial regeneration," "silviculture," and "planted forests" are closely linked to the implementation of forest plantations.

In Costa Rica, the categories of "silviculture" and "natural regeneration" are related to FONAFIFO's initiatives to promote timber forest plantations. Likewise, natural regeneration and silviculture, beyond plantations (e.g., sustainable forest management), generated half of the new jobs associated with natural and semi-natural ecosystems.

In the case of El Salvador, the coffee sector contributed the most to job creation by promoting coffee replanting plans that included agroforestry arrangements.

Graph 13. Distribution of jobs generated by restoration modality for each country

El Salvador

- Agroforestry 80%
- Good Practices 8%
- Natural Regeneration 4%
- Planted Forests 5%
- Others 3%

Guatemala

- Planted Forests and Shrub Cover 60%
- Silviculture 34%
- Others 6%

Costa Rica

- Natural Regeneration 29%
- Planted Forests and Shrub Cover 26%
- Agroforestry 24%
- Others 17%
- 4%
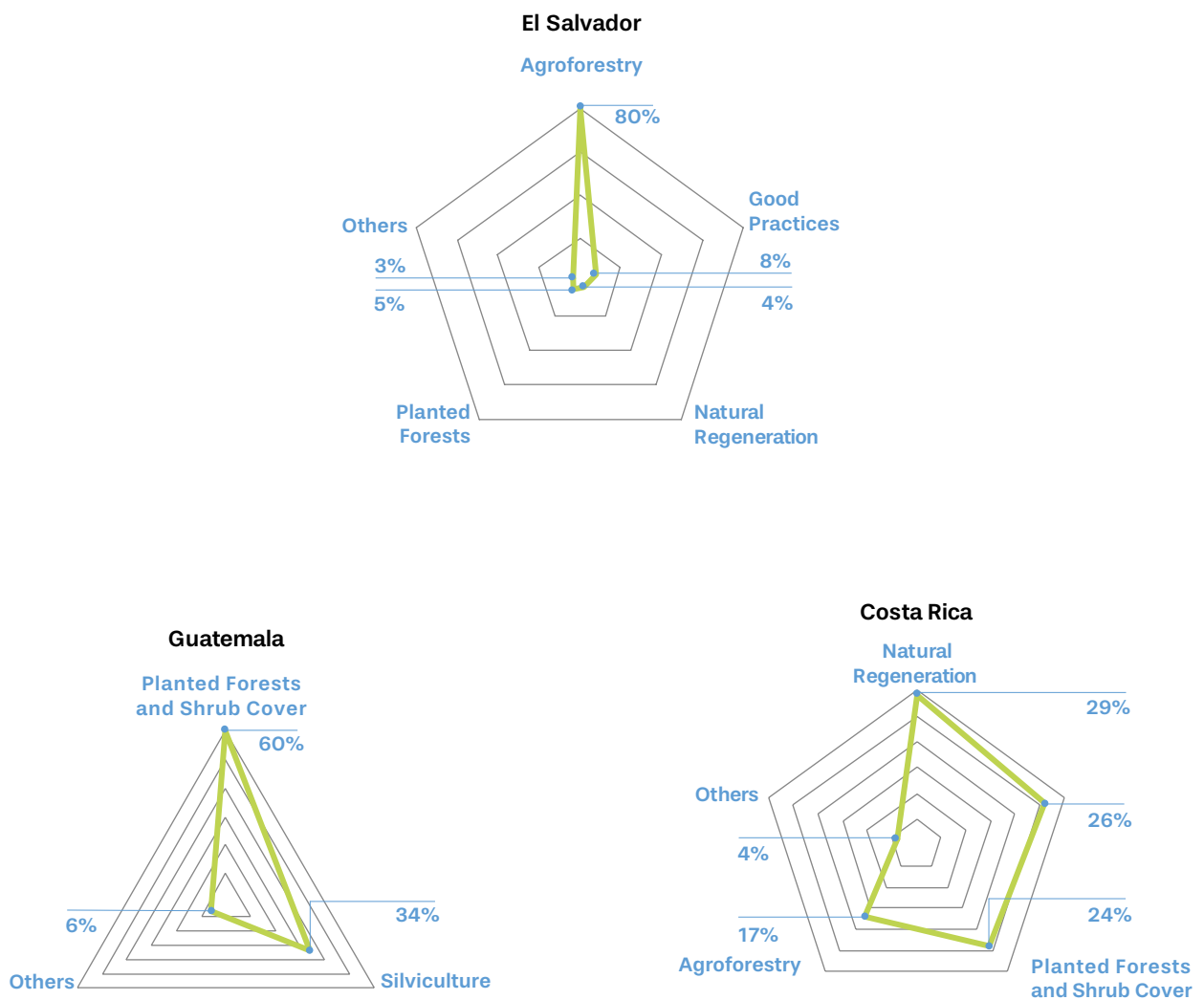
Source: Own elaboration.

Variable 8.4   Gender distribution of created jobs

▪ Graph 14 shows the gender breakdown of jobs created in Costa Rica and Guatemala. In both cases, men´s participation is notably higher than that of women (on average 3 times higher – 25% of jobs were occupied by women and 75% by men).

Graph 14. Gender Distribution of Jobs Created in Guatemala and Costa Rica

Guatemala

Women 35%

Men 65 %

Costa Rica

Women 16%

Men 84%
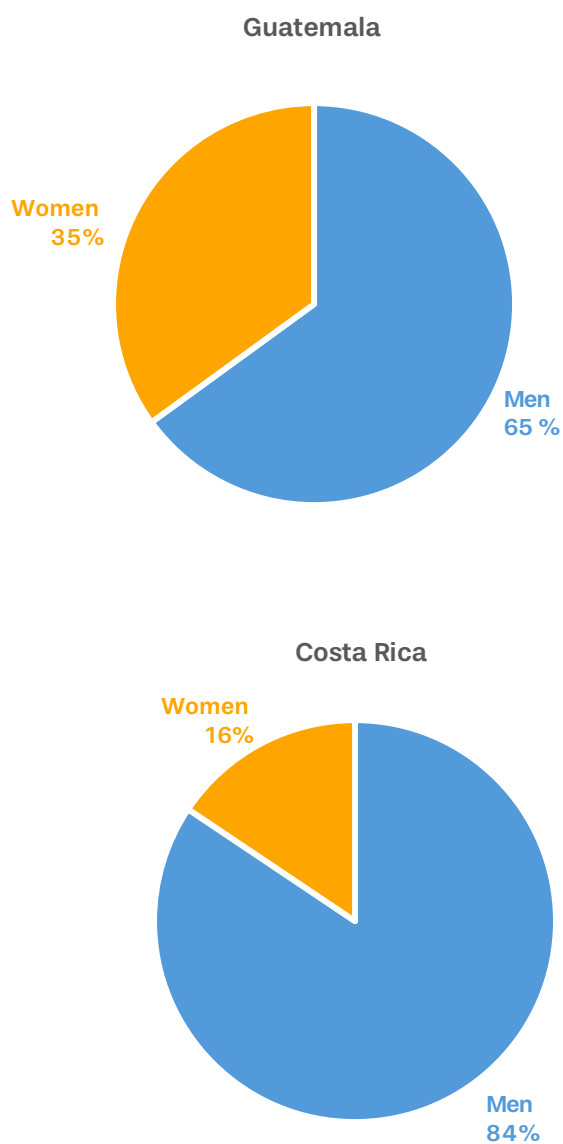
Source: Own elaboration.

**Comparative review of the impact indicators
of Barometer applications**

Below are some observations and comments derived from the analysis of the impact indicators of Barometer applications in the three countries considered in this study.

Regarding Indicator 5:
Land

- **Number of hectares restored:** Costa Rica reports the highest number (482,000 ha), followed by Guatemala (379,192 ha), and El Salvador (238,948 ha).

- **Progress towards meeting their Bonn Challenge restoration goals:** Costa Rica has made the most progress (48%), followed by Guatemala (32%), and El Salvador (24%).

- **Yearly progress achieved (total progress / number of years) in relation to the**

- **Bonn Challenge goals**: Costa Rica shows the fastest progress (4.8% per year), followed by El Salvador (4%), and Guatemala (3.2%).

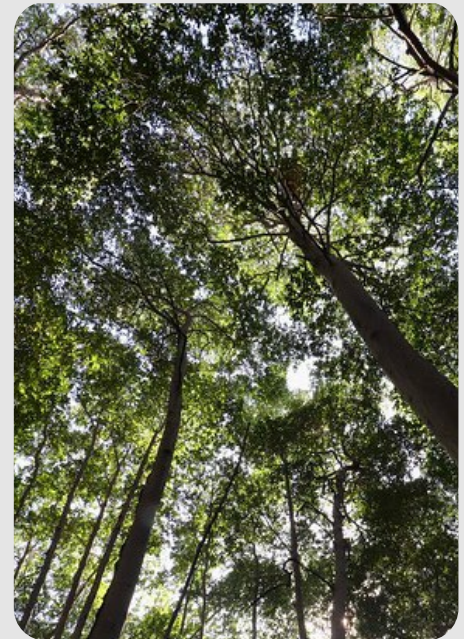- **Restoration modalities:** Over 86% of the total restored areas in Guatemala, El Salvador, and Costa Rica were carried out through 3–4 restoration modalities, with the most common and significant being water and land protection (conservation actions), silviculture, and better land management.

Pablo Arturo López Guijosa/IUCN.

Regarding Indicator 6:
Climate

- Restoration actions recorded in the three countries increased **carbon storage** by approximately 8 million tons of CO_2e. Guatemala made the largest contribution (75%). The variability in the climate change mitigation potential per hectare, according to the type of restoration interventions, is due to different methodological approaches and information availability in each country.

IUCN.

Regarding Indicator 7: Biodiversity

- Biodiversity impacts: The three countries reported restoration in areas located within Protected Areas (an average of 21% of the restored areas in each country) and within Key Biodiversity Areas (an average of 29% of the restored areas in each country). In El Salvador 35% of the restored areas are located in Biological Corridors.

- Costa Rica also reported improvement in the conditions of habitats of threated or endagenered species (following the IUCN Red List).

Sean Southey/IUCN.

Regarding Indicator 8: Economy

- The main economic impacts of restoration are estimated for job creation (372,000 new jobs in the three countries).

- Most of the generated jobs are linked to three restoration modalities: agroforestry (32% of jobs), planted forests and shrub cover (30% of jobs), and silviculture (20% of jobs).

- Regarding gender distribution, men´s participation is notably higher than that of women. (75% men and 25% women).

Ahmid Daccarett/IUCN

Paul Aragón/IUCN

4. Challenges, opportunities, and recommendations for the adoption and use of the Barometer

This section summarizes the main challenges, opportunities, and recommendations identified from the results of the Barometer application in the three countries.

4.1   Challenges for the adoption and use of the Barometer

Underreporting and insufficient data: Variability in data quality, coupled with the need to work with existing information, limits the outcomes of the Barometer application. Additionally, data submission is mostly voluntary, hindering the acquisition of comprehensive and representative data. To address this challenge, it is crucial to raise awareness among stakeholders about the direct and indirect benefits of sharing data more widely. It will enhance mechanisms for data collection, verification, and updates. For instance, one option could be to offer access to results–based payments, such as REDD+ credits —managed by governments— to entities sharing their data. Furthermore, report generation with standardized variables for each organization could be promoted external communication and funding initiatives. This approach would also provide evidence for the private sector to further engage in restoration actions.

Variability and lack of uniformity in data and analysis methodology: Lack of standardization in collected restoration data from different sources, including variations in data, units, and reporting formats, complicates aggregation, comparison, and analysis. Inconsistent reporting arises from a lack of coordination among institutions involved in restoration efforts. To achieve comparable and consistent results over time and between countries, it is recommended to use the same methodology in successive Barometer applications, both nationally and regionally. Standardized and even centralized databases, such as a regional repository, would facilitate the compilation and

regional aggregation of country results. To address such challenges, collaboration among regional environment and agriculture ministries to standardize restoration approaches and carbon indicator measurements is recommended. Additionally, coordination among national statistical institutes could promote greater uniformity in employment indicator measurements. The use of the Red List as a common indicator for monitoring restoration impacts on biodiversity could also be promoted.

Limited capacity for data collection and recording: Capabilities for spatial information (polygons) collection and analysis, especially with regard to automatic processing and data quality verification mechanisms, are still limited. Insufficient equipment and technological skills to effectively capture and utilize information are perceived as major obstacles to national authorities adopting the Barometer. These limitations are particularly critical at the subnational government level, where capacities to record and report restoration actions are virtually non–existent.

Emerging intersectoral coordination: Effective intersectoral coordination, particularly between agriculture, environment, and territorial planning, is crucial for restoration. Without it, there is a risk of duplication or dispersion of efforts, wasting the potential for synergies between restoration actions. In the context of the Barometer application, this is evident, for example, in information gaps from sectors implementing restoration actions but not participating in national registration and monitoring initiatives.

4.2 Opportunities for the adoption and use of the Barometer

Monitoring restoration in strategic areas: The Barometer of Restoration facilitates monitoring restoration actions and aligning them with priorities for areas requiring urgent and strategic interventions. Spatial and financial analyses enable verification, adjustment, and optimization of resource allocation, focusing restoration efforts on ecologically important areas, particularly those addressing climate change and/or offering greater socio–economic benefits (e.g., water and food security).

Improving planning and resource allocation: The Restoration Barometer is a tool providing spatial analyses that contribute to enhancing monitoring and planning of restoration actions. It identifies areas where positive results are being achieved in terms of benefits and co–benefits, as well as those where restoration investment is scarce or insufficient. This helps focus efforts and resources more effectively.

Private sector involvement in restoration: Collaboration with the private sector is an opportunity to drive large–scale restoration, addressing diverse ecosystems, and a greater number of priority areas, while improving access to financial and technological resources for restoration. The Barometer can play a key role by providing up–to–date, transparent, and reliable information on the status and progress of restoration, showcasing private sector contributions, providing evidence of profitability/benefits from investments, and facilitating active participation.

Integration of data at multiple scales: The Restoration Barometer offers a simple and efficient structure for monitoring and reporting restoration activities. This allows multiple actors at local, national, and regional levels to use it, facilitating the collection and analysis of data at different scales for more accurate and comprehensive information aggregation. This, in turn, supports countries and the region in monitoring progress and decision–making to fulfill their restoration mandates and commitments.

Rachel Claire/Pexels

Regional adoption: Integration of the Barometer into the CAC–CCAD[3] AFOLU initiative provides an opportunity to establish a common basis for monitoring restoration actions in multiple countries. The adoption of the Barometer as a standard tool would standardize data collection and analysis at the regional level, allowing the aggregation of results, demonstrating the region´s collective weight and its contributions to ecosystem restoration.

This regional integration would strengthen collaboration between countries, fostering a joint vision and coordinated actions in landscape restoration. Regionally, homogenization would enable the unification of key results for regional and international policy negotiations, agreements, and initiatives.

Barometer as a complement to MRV systems:
The Barometer could complement remote sensing–based MRV systems by providing a detailed record of restoration actions not easily measurable through satellite imagery. This is particularly relevant for achieving the level of detail and precision necessary for plot or farm–scale monitoring, which would require a significant investment. Beyond the focus on forests, the Barometer allows the inclusion of other ecosystems prioritized by countries, providing supplementary information. It enables monitoring of goals and indicators not only in terms of restored hectares but also in terms of climate, economic, and biodiversity benefits, such as the conservation of species on the Red List. Furthermore, it highlights specific contributions to restoration and its associated impacts of organizations that shared their information.

4.3 Recommendations for the adoption and use of the Restoration Barometer

Reinforce/update the regulatory framework:
Some countries express the need to strengthen their regulatory frameworks related to restoration by establishing long–term public policies that drive restoration actions in areas in need. This could also provide elements for a solid and consistent legal framework for the use of the Restoration Barometer.

Enhance Interinstitutional Coordination: Promote greater coordination among different institutions involved in restoration, both public and private. This includes establishing mechanisms for collaboration and effective communication to share information, avoid duplications, improve the quality of the data used, and standardize institutional databases.

Establish a unified information repository: Creating a centralized repository that gathers information on restoration progress at the national (and even regional) level, including data from non–governmental organizations and the private sector, would facilitate informed decision–making and allow for complementary analyses. Ideally, this would be a single, official repository of restoration data at both the national and regional levels. The simplicity and consistency of the Barometer protocol could serve as a good foundation for structuring and consolidating this repository.

Paul Aragón/IUCN

Secure backing and commitment from state institutions: For the effective implementation of the Barometer, it is recommended to work closely with relevant government institutions to ensure adequate access to information, promote transparency in the data collection process, and facilitate the effective use of results. A public and transparent call for data on restoration actions is considered a good practice.

It is of utmost importance to maintain constant communication that fosters trust, commitment, and active involvement of government institutions in the process having. Experience has demonstrated the added value of strong leadership from the government regulatory body for restoration, along with lobbying and negotiation actions with sectoral organizations. The support at the highest level of national authorities is fundamental.

Continue ongoing Barometer appropriation processes: Considering the positive acceptance and active participation of countries involved in Barometer applications, it is recommended to strengthen and support the transfer of knowledge and responsibilities to relevant national institutions, such as INAB in Guatemala, MARN in El Salvador, and SINAC in Costa Rica.

Negotiating and establishing a clear plan for participatory transfer of Barometer applications and capacities from organizations like IUCN and affiliated partners to national institutions will ensure continuity in data collection and updates. Support and technical assistance to these institutions are essential to consolidate ongoing regional processes of Barometer appropriation. In this regard, it is suggested to continue with biannual Barometer applications to keep information up-to-date, next applications be led by the corresponding government institutions, starting with those that have been fully involved in the initial Barometer applications.

5. Opportunities for the use and adoption of the Restoration Barometer within the framework of the AFOLU regional initiative

5.1 AFOLU Regional Initiative and MRV System

The regional initiative "Building Resilience in the SICA Region through a Synergistic Approach between Mitigation and Adaptation, focusing on the Agriculture, Forestry, and Other Land Uses (AFOLU) sector," driven in an intersectoral manner by CCAD and CAC, was launched in 2019. Its goal is to restore 10 million hectares and achieve Carbon Neutrality of the AFOLU sector in the Central American Region by 2040. To achieve this, "CCAD and CAC propose a comprehensive approach to landscape restoration, where forested areas will be rehabilitated and preserved, biological corridors will be established through the adoption of resilient agroforestry and silvopastoral systems, and agricultural areas will be transformed by adopting low-carbon sustainable practices, aiming to increase productivity and neutrality in emissions from this sector" (Obando, 2021).

As part of this regional initiative, work is underway to design a regional Measurement, Reporting, and Verification (MRV) system that strengthens national systems and allows for reporting progress in emissions reduction and resilience building.

As part of the progress in designing its MRV system, AFOLU identified the following key categories to be considered for monitoring mitigation and adaptation[4]. These categories are based on the 5 components of the AFOLU strategy, IPCC methodological guidelines, and FAO recommendations (See chart).

Quang Nguyen Vinh/Pexels

Mitigation Monitoring

- **Forest Emission Monitoring:** Includes the reduction of emissions from avoided deforestation and degradation in natural forests and mangroves, as well as removals through growth in secondary forests and forest plantations.

- **Agroforestry Perennial Crop (SAF) Monitoring:** Considers emission reductions from avoided deforestation and degradation in natural forests and mangroves, as well as from growth in secondary forests, forest plantations, and mangroves.

- **Livestock and Manure Monitoring:** Involves reducing emissions from enteric fermentation in meat and dairy livestock, as well as manure management in pig and poultry farms.

- **N_2O and CH_4 Emission Monitoring in Crops:** Includes emissions from urea fertilization in rice, sugarcane, and banana crops, methane emissions in rice cultivation, and non-CO_2 gas emissions from sugarcane straw burning.

5.2 Potential use of the Restoration Barometer for the AFOLU MRV system

Given the design and application characteristics of the Barometer, it is possible to identify several areas of opportunity for its adoption as part of the AFOLU MRV system.

The impact indicators of the Barometer, particularly those related to land, climate, and biodiversity, provide a simple and effective way to address the monitoring of mitigation and, to a large extent, adaptation, as proposed in the terms of the AFOLU MRV system.

The methodological framework of the Barometer, along with concrete experiences of its application in countries within the region, provides practical and useful inputs to be considered in the work of methodological harmonization and data consistency carried out by the AFOLU Regional Table.

The adoption and use of the Barometer would also enhance the design principles currently envisioned in the proposed MRV system[5] (See chart).

The design principles currently envisioned in the proposed MRV system

- **"Countries should not change their emissions accounting methods":** The Restoration Barometer offers a flexible framework for assessing the potential impact of restoration on the climate, using available and official information (e.g., emission factors, REDD+, NAMAs records) and employing recognized tools (EX–ACT) to fill possible information gaps. This approach encompasses carbon reservoirs (e.g., tree biomass, soil carbon) considered within the AFOLU MRV system.

- **"The monitoring system would be based on data from official reports":** National applications of the Barometer would allow feeding into both national reports and the regional AFOLU MRV system without requiring additional inputs.

- **"Comparability of monitoring statistics among SICA countries":** The harmonization process facilitated by the adoption of the Barometer, led by the AFOLU Regional Table, would enable the generation of comparable metrics over time and among SICA countries. It provides a typology of restoration actions* that recognizes the diversity of ecosystems and possible interventions, adaptable to national contexts, offering consistency and comparability between countries. The regional adoption of the Restoration Barometer would allow reporting on restoration actions, i.e., data on actions, for both current uses of land considered within the AFOLU MRV system (forest lands, agroforestry perennial crops, crops, livestock, and manure) and those to be integrated in the future (pastures, wetlands, urban settlements, other lands).

* https://restorationbarometer.org/knowledge-hub/iucn-restoration-intervention-typology-for-terrestrial-ecosystems/

- **"Regional System would avoid double accounting among AFOLU subsectors":** By adopting the Barometer at the national level, there would be no need for independent sectoral subsystems. This would prevent double accounting that can occur between AFOLU sectors (for example, data from forest monitoring and agroforestry system monitoring).

- **"Sustainability of the MRV System":** By adopting the Barometer as a regional methodology, SICA countries would be responsible for applications at the national level. At the regional level, the AFOLU MRV Table, with support from the AFOLU technical arm, would be responsible for the consolidation, compilation, aggregation, and analysis of data at the regional level. This multi–actor and multilevel arrangement increases the chances of success and continuity of the AFOLU MRV system over time. Additionally, the Restoration Barometer could provide an institutional methodological framework for recording high–potential climate change mitigation restoration actions in land use within the MRV system, where remote sensing has limitations in grasslands and wetlands.

IUCN

Implementing the Barometer would enable SICA to have a harmonized monitoring system, strengthening its capacities in designing, negotiating, and implementing regional investments and initiatives using national, multilateral, and bilateral funds. Furthermore, this system would provide solid support to demonstrate results and impacts at the regional and international levels, as well as promote the exchange and capacity building among SICA member countries.

The regional adoption of the Restoration Barometer within the AFOLU framework presents a promising opportunity. The Barometer, as an approach, offers the possibility of addressing the intersections between agriculture and environment (including protected areas, conservation zones, and productive land uses) in a practical way. Additionally, it presents concrete and specific contributions to facilitate the implementation of a GHG MRV for AFOLU, for example, through monitoring the permanence of restoration with high-resolution satellite images (IUCN–Airbus Foundation agreement).

In the context of SICA countries, it would also capitalize on successful experiences in the region that have used the Barometer, leveraging existing capacities, such as the case of El Salvador. Lessons learned can be socialized with other countries that have not yet applied the Barometer, thus fostering South–South cooperation and generating a broader regional impact.

These experiences have also demonstrated how the intersectoral approach of the Barometer allows for comprehensive analyses based on sectoral exercises.

By implementing a regional approach, the Barometer would make visible contributions to GHG mitigation and carbon-neutral production.

5.3 Contributions of the CCAD and CAC Secretariats regarding the potential of the Restoration Barometer within the AFOLU MRV system

In the context of this study, the expectations and perspectives regarding the potential use of the Restoration Barometer within the MRV (Measurement, Reporting, and Verification) system of the AFOLU initiative were explored with the CAC and CCAD Secretariats, CCAD, and the AFOLU–FAO technical team (see Annex 4 – list of participants). Firstly, participants agreed on the importance of establishing a robust MRV system to monitor and evaluate progress in land and forest restoration in the region. The potential contributions of the Restoration Barometer to complement the AFOLU MRV system were identified.

It was noted that the AFOLU initiative focuses on restoration actions, where both mitigation and adaptation indicators converge. Hence, the importance of integrating restoration actions into the AFOLU MRV was emphasized. While being considered a good practice, it would strengthen transparency and data credibility at the regional level. So far, efforts in designing the MRV have been more focused on mitigation issues and less on adaptation issues.

In terms of restoration, it was mentioned that there is no agreed standard . However, it is considered valuable to extend the MRV to this topic, since adaptation practices are often recorded as restoration actions. In this sense, **the Barometer could be a good complement as it directly addresses ecosystem restoration actions, complementing national records of adaptation actions**. Furthermore, the possibility of linking restoration actions recorded in the Barometer with future compensation mechanisms was identified, thus complementing the joint work of CAC and CCAD. For example, the biodiversity indicator could be considered a representative proxy indicator of the restoration's contribution to the conservation of biological diversity, expanding the AFOLU approach to compensations for both carbon and biodiversity.

Regarding progress in the design of the AFOLU MRV, participants highlighted training actions and strengthening of technical aspects in the countries. They also identified the challenges related to data consistency and harmonization of systems among countries. An example of the latter is the variety of approaches and tools currently used by countries to estimate their GHG emissions. In this regard, **the potential of the Barometer to provide a framework that facilitates methodological harmonization between countries is confirmed, as it allows contributions from both forest conservation and the restoration of natural and agricultural ecosystems to be considered in climate change mitigation**.

Another highlight was the definition and monitoring of AFOLU restoration goals. The 2040 AFOLU goal is to restore 10 million hectares. This goal represents the sum of the Bonn Challenge goals of the three countries, posing both a challenge and an interesting opportunity. In fact, by monitoring progress in restoration at the national level, progress in the regional goal can also be tracked. In this context, it is recognized that it would be highly desirable to have a harmonized methodological approach among countries. The Barometer could contribute to the construction of the necessary agreements for achieving methodological integration. The integration may facilitate data aggregation and progress in reporting at national and regional levels.

One of the challenges identified by the AFOLU–FAO technical team is how to link existing mitigation records with an officially recognized MRV, as emissions estimates from projects often differ from national reports. The region´experiences in the Barometer application could contribute to dialogues between countries on this challenge and to build agreements for a possible harmonized approach in the region.

Opportunities for synergies between the Barometer and the MRV system were also identified (greenhouse gas measurement methodologies, monitoring the permanence of restored areas, information collection methods – points, farms, polygons, etc.). The Barometer could provide data for the MRV system (such as monitoring the permanence of areas through the IUCN/Airbus initiative). It will therefore complement the countries information from REDD+ reports.

Beyond the afore-mentioned technical challenges, there is a significant opportunity in the potential adoption of the Barometer as a strategy to align tools between countries and achieve comparable data in the region. In this regard, the adoption of the Barometer by countries that expressed interest in its application[6] would contribute to progress towards regional monitoring of AFOLU.

The importance of addressing this process through close collaboration and genuine mutual understanding is emphasized, avoiding the imposition of unilateral solutions. **A key message is that there is still work to be done in the design and implementation of a monitoring, reporting, and verification system for the AFOLU initiative at the regional level**. In this moment, discussions are focused possible ways to harmonize existing tools. From this approach, **the concept of a "protocol" was proposed as a way to effectively align countries, ensuring that solutions are not imposed but consensus-driven for the benefit of all involved**.

In general terms, the potential and applicability of the Barometer to AFOLU goals is recognized, since it convers not only restoration activities but conservation and protection. However, concerns were expressed about duplication of efforts by adopting a regional MRV, parallel to the national monitoring system. The alignment of national systems is fundamental for avoiding duplication of efforts. Regarding this point, **the need to promote strong collaboration between national institutions, especially ministries of environment and agriculture, was highlighted as a way to advance the construction of a harmonized MRV system in the region.**

The alignment of national systems with regional systems is fundamental for avoiding duplication of efforts. The region´experiences in the Barometer application could contribute to dialogues on this topic and to build agreements for a possible harmonized approach in the region.

Paul Aragón/IUCN.

6. Conclusions

Restoration encompasses various intervention modes that demonstrated their effectiveness in addressing current environmental and socio–economic challenges. It allows the recovery of degraded ecosystems, restoring their capacity to provide ecosystem services while enabling rational and sustainable use of resources. The ability to integrate conservation and development goals has sparked growing interest among a global community increasingly aware of the importance of recovering and preserving ecosystems, biodiversity, and the services they provide. This heightened awareness has led to an increase in the number and diversity of actors involved in restoration efforts at various scales, including governments, non–governmental organizations, private enterprises, and local communities, establishing itself as a cross–sectoral field of action.

Consequently, there is a growing need for reliable data and information that capture the complexity and diversity of actors, providing quality inputs for decision–making in restoration efforts. In this context, there is an increasing demand for effective restoration monitoring systems that track actions, assess restoration impacts and generate evidence for decision–making.

Since 2015, IUCN has supported countries in the region on restoration and monitoring priorities. Since 2021, it has been collaborating with the Airbus Foundation to develop a methodology for validating and monitoring the permanence of restoration using satellite imagery. This methodology is expected to be integrated into the Restoration Barometer platform as a support service for countries reporting their progress on the online portal.

The diversity and multiplicity of actors involved in restoration pose an additional challenge: the need to improve coordination among actors and standardize the design and reporting parameters of interventions. In this context, the Restoration Barometer emerges as a tool that provides a simple and comprehensive framework for monitoring restoration at multiple levels and in terrestrial and coastal ecosystems.

The various applications of the Barometer, as summarized in this report, demonstrate its adaptability to different contexts, its user–friendliness, and the power of its results for informing decisions. Among other things, the Barometer allows for the evaluation of restoration progress, quantification of climate, economic, and biodiversity impacts, as well as identification of areas for improvement with respect to enabling conditions for restoration (policies, planning, monitoring, and financing), while actively involving relevant stakeholders.

Recent applications of the Barometer in Guatemala, El Salvador, and Costa Rica have initiated processes of national ownership that require ongoing support and guidance for consolidation. These initiatives are an opportunity to expand and deepen Barometer adoption, by other countries in the region and regional bodies such as the Central American Integration System (SICA) and its initiatives (AFOLU implemented by the Central American Commission for Environment and Development–CCAD and the Central American Agriculture Council–CAC).

In this way, the Barometer provides a standardized methodological framework for reporting and monitoring

restoration, facilitating coordination among countries and institutions, focusing interventions in priority areas, and maximizing restoration results. Thus, monitoring investment and restoration actions are more effective, it provides inputs for informed and strategic decision-making, while contributing to the long-term success of restoration initiatives.

Consultations with representatives from CAC and CCAD confirmed the potential and interest in eventually adopting the Restoration Barometer as a complement to the MRV system of the AFOLU regional initiative. They also recognized the need of working on precise definitions and agreements to facilitate the harmonization of the AFOLU MRV system with the Bonn Challenge Barometer. The Barometer has the potential to harmonize efforts among countries, improving measurement and reporting of goals in the region.

In conclusion, adopting the Restoration Barometer as part of the AFOLU MRV system represents a strategic opportunity to strengthen decision-making mechanisms. The design and application characteristics of the Barometer, along with its impact indicators, align with the proposed framework for the AFOLU MRV system. Successful experiences in the region and the Barometer methodology offer practical inputs for methodological harmonization among countries.

Adoption of the Barometer would reinforce the design principles of the MRV system, allowing countries to maintain their emission accounting methods and rely on existing official reports. It would ensure the comparability of monitoring statistics among SICA countries and prevent duplication of efforts in the AFOLU subsectors.

Regional adoption of the Barometer would also address the cross-sectoral nature of AFOLU, capitalize on successful experiences, strengthen existing capacities, and showcase the sector's contributions at the regional level. Through this common framework, countries would have evidence of the benefits and progress of restoration, enabling them to share experiences, exchange knowledge, and collaborate in mitigation and adaptation to climate change, biodiversity conservation, and the well-being of the region.

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Endnotes

1. For example, the training on the application of the Restoration Barometer provided during the first Regional Congress on Sustainable Forests and Landscapes in Panama in 2022.

2. Typology of Global Ecosystems 2.0 by IUCN. Coasts and Mangroves; Deserts and Semi–Deserts; Agricultural lands and areas of mixed use; Forests and Woodlands; Grasslands, Scrublands, and Savannas; Peatlands and Wetlands; Rivers, Streams, Lakes; Urban Areas; and Others (Polar, Alpine, etc.).

3. Regional Initiative: Building Resilience in the SICA Region through a Synergistic Approach between Mitigation and Adaptation, with a Focus on the Agriculture, Forestry, and Other Land Uses (AFOLU) Sector.

4. Obando–Vargas, G. 2021. Diseño de un Sistema de Monitoreo, Reporte y Verificación (MRV) Regional para el Sector AFOLU, pages 13–15.

5. Obando–Vargas, G. 2021. Diseño de un Sistema de Monitoreo, Reporte y Verificación (MRV) Regional para el Sector AFOLU, page. 21

6. In the case of Honduras and Belize, both countries expressed interest in applying the Barometer during the training session held within the framework of the first Regional Congress on Sustainable Forests and Landscapes in Panama in 2022.

Annex

Annex 1

Summary Sheet Structure

Dimension – Indicators	Variables
General Data on Barometer Application	Country Number of Barometer application exercises conducted to date Year of the last Barometer application Period covered by the last Barometer application report Country's Bonn Challenge target Progress made toward the country's Bonn Challenge target Restoration governance in the country Key actors in restoration in the country Main restoration modalities implemented during the period Map of restored areas Restored areas in relation to prioritized restoration areas Key challenges and opportunities identified
Application process	Methodology for Barometer Application Information sources Timeline of the application process Results Report
Indicator 1: Policies and institutional arrangements	Variable 1.1 Existing Policies, Plans, and Strategies Related to Restoration Issues
Indicator 2: Funding	Variable 2.1 Public funds invested in restoration Variable 2.2 National private sector investment in restoration Variable 2.3 International cooperation support for restoration Variable 2.4 Philanthropic and national non–profit organizations' support for restoration Variable 2.5 Distribution of financing by type of restoration intervention
Indicator 3: Technical planification	Variable 3.1 Restoration planning exercises Variable 3.2 Technical capacities for planning and implementing restoration actions
Indicator 4: Monitoring systems	Variable 4.1 Operating restoration monitoring systems
Indicator 5: Land area	Variable 5.1 Number of hectares restored Variable 5.2 Number of hectares restored by restoration modality or ecosystem type
Indicator 6: Climate	Variable 6.1 CO_2 Capture
Indicator 7: Biodiversity	Variable 7.1 Hectares Restored in Key Biodiversity Areas (KBAs), Protected Areas (PAs), and/or Biological Corridors (BCs) Variable 7.2 Creation or Improvement of Existing Habitats for Species on the Red List
Indicator 8: Economy	Variable 8.1 Number of Short–Term Jobs Variable 8.2 Number of Medium and Long–Term Jobs Variable 8.3 Jobs Generated by Restoration Modality Variable 8.4 Gender Distribution of Created Jobs

Annex 2

Summary sheets of the results of the Barometer application in Guatemala, El Salvador, and Costa Rica

Summary sheet of the results of the Barometer application in Guatemala

Summary sheet of the results of the Barometer application in El Salvador

Summary sheet of the results of the Barometer application in Costa Rica

Annex 3

Consultations with representatives of CAC, CCAD, and technical team of FAO on the usefulness, added value, and potential use of the Restoration Barometer as a complement to MRV systems within the framework of the regional AFOLU initiative

Consultation with representatives of CAC and CCAD — July 25, 2023

SE– CCAD

- Raúl Ernesto Artiga
- Marvin Centeno (GIZ)
- Alexandra Sánchez Urias

SE– CAC

- Ricardo Montero
- Ligia Córdoba

IUCN

- Tony Nello
- Alejandro A, Imbach, Consultor

Consultation with the technical team of AFOLU–FAO — July 28, 2023

SE–CCAD

- Raúl Ernesto Artiga
- Alexandra Sánchez Urias

SE– CAC

- Ligia Córdoba

FAO

- Carla Ramírez
- Xinia Soto Solano
- Carlos Pérez

IUCN

- Tony Nello
- Alejandro A. Imbach, Consultor