



Outcome Assessment and Impact Estimation: FTA Research Contributions Addressing Accelerating Rates of Deforestation and Forest Degradation (Challenge 1)

An Integrative Study of the Forests, Trees and
Agroforestry Research Program (2010-2020)



RESEARCH
PROGRAM ON
Forests, Trees and
Agroforestry



Alliance

Cover photo: Pilot farm in Yangambi, DRC. Yangambi, Democratic Republic of Congo. Photo: Fiston Wasanga/CIFOR

Any views expressed in this publication are those of the authors. They do not necessarily represent the views of CIFOR, ICRAF, Bioversity International, the CGIAR Research Program on Forests, Trees and Agroforestry, the editors, authors' institutions or financial sponsors.

Acknowledgements

The MELIA teams at CIFOR, ICRAF, and Bioversity International, in close partnership with the Sustainability Research Effectiveness Program at Royal Roads University in Canada, thank all interview respondents who participated in the integrative study of the Forests, Trees and Agroforestry (FTA) Research Program. We extend special thanks to FTA partners at CIRAD, CATIE, INBAR, and Tropenbos for their feedback and inputs to the assessment of Challenge 1. We also thank Vincent Gitz (FTA Director in phase 2) and Alexandre Meybeck (FTA senior technical adviser) for their feedback, suggestions, and edits on the report. The final draft was reviewed by the following members of the Independent Steering Committee of FTA (Anne-Marie Izac, Susan Braatz, Linda Colette, Richard Stanislaus Muyungi, Florencia Montagnini, Robert Nasi, René Boot, Vincent Gitz, Stephan Weise). We extend special thanks to the peer reviewers of the Challenge 1 report, Susan Braatz, Vincent Gitz, and Alexandre Meybeck.

Produced by

CIFOR (Jean-Charles Rouge, Tobias Thürer, Pasha Rachman, Stephanie Jones, George Wakesho), ICRAF (Karl Hughes, Kai Mausach, Ravic Nijbroek, Yoshiko Saigenji), Bioversity International (Elisabetta Gotor, Marta Kozicka, Gabriela Wiederkehr), FTA-MELIA (Federica Coccia), and Royal Roads University's Sustainability Research Effectiveness team (Brian Belcher, Rachel Claus, Rachel Davel, Daniela Pinto).

© FTA 2020



**RESEARCH
PROGRAM ON**
**Forests, Trees and
Agroforestry**

This evaluation was carried out as part of the as part of the [CGIAR Research Program on Forests, Trees and Agroforestry](#) (FTA). FTA is the world's largest research for development program to enhance the role of forests, trees and agroforestry in sustainable development and food security and to address climate change. CIFOR leads FTA in partnership with ICRAF, the Alliance of Bioversity International and CIAT, CATIE, CIRAD, INBAR and TBI.

FTA's work is supported by the [CGIAR Trust Fund](#).

Table of Contents

List of Tables	iv
List of Figures	iv
List of Boxes	iv
List of Acronyms	v
1 Executive Summary	viii
1.1 Introduction	viii
1.2 Methods	viii
1.3 Challenge 1 Theory of Change	x
1.4 Results	xi
1.5 Limitations.....	xi
1.6 Lessons Learned and Recommendations.....	xii
2 Introduction	1
3 Methods	3
3.1 Limitations.....	16
4 Challenge 1 Theory of Change	17
5 Results	20
5.1 Outcome Assessment.....	20
5.1.1 REDD+ Cluster Results	20
5.1.2 Wetlands Cluster Results.....	28
5.1.3 Fire and Haze in Indonesia Cluster Results.....	31
5.1.4 Agroforestry Concessions (AFC) in Peru Cluster Results.....	34
5.1.5 Sustainable Forest Management (SFM) in Mesoamerica Cluster Results.....	35
5.1.6 Sustainable Forest Enterprises (SFE) in Cameroon Cluster Results	37
5.1.7 Oil Palm in Indonesia Cluster Results.....	39
5.1.8 Sustainable Forest Management (SFM) in the Congo Basin Cluster Results.....	41
5.1.9 FLEGT/VPA Cluster Results.....	44
5.1.10 Sustainable Forest Management (SFM) in Mozambique Cluster Results.....	46
5.1.11 Timber Markets in Sub-Saharan Africa Cluster Results.....	48
5.2 Impact Estimation.....	50
5.3 Assumptions	51
6 Lessons Learned and Recommendations	52
6.1 Lessons Learned on Research in Deforestation and Forest Degradation	52
6.2 Challenges to Overcome and Recommendations for Enhanced MELIA	54
References	58
Appendix 1. Cluster-level ToCs and Explanations: Challenge 1 (Deforestation and Forest Degradation)	60
Appendix 2. Assessment of Assumptions, Deep Dives	82
Appendix 3. Disaggregated Cluster Appraisal of Existing Evaluation Evidence	84
Appendix 4. Evidence Sources	100

List of Tables

Table 1. FTA’s Expected Results.....	1
Table 2. Summary Cluster-level Appraisal Process of Evidence for Challenge 1	6
Table 3. REDD+: Key results	26
Table 4. Wetlands: Key results.....	30
Table 5. Fire and Haze in Indonesia: Key results.....	33
Table 6. Agroforestry Concessions in Peru: Key results.....	35
Table 7. Sustainable Forest Management in Mesoamerica: Key results.....	37
Table 8. Sustainable Forest Enterprises in Cameroon: Key results.....	38
Table 9. Oil Palm in Indonesia: Key results.....	40
Table 10. Sustainable Forest Management in the Congo Basin: Key results.....	43
Table 11. FLEGT/VPA in Central Africa: Key results	46
Table 12. SFM in Mozambique: Key results.....	47
Table 13. Timber markets in Sub-Saharan Africa: Key results.....	49
Table 14. Challenge 1 Assumptions Assessment	51

List of Figures

Figure 1. Overarching ToC outlining FTA contributions to Challenge 1 (Deforestation and Forest Degradation)	19
Figure 2. Countries where FTA has carried out research on topics mapped to Challenge 1	50
Figure 3. Cluster ToC for FTA research on REDD+	61
Figure 4. Cluster ToC for FTA research on Wetlands	63
Figure 5. Cluster ToC for FTA research on Fire and Haze in Indonesia	65
Figure 6. Cluster ToC for FTA research on Agroforestry Concessions in Peru	67
Figure 7. Cluster ToC for FTA research on Sustainable Forest Management in Mesoamerica.....	69
Figure 8. Cluster ToC for FTA research on Sustainable Forest Enterprises in Cameroon	71
Figure 9. Cluster ToC for FTA research on Oil Palm in Indonesia	73
Figure 10. Cluster ToC for FTA research on Sustainable Forest Management in the Congo Basin	75
Figure 11. Cluster ToC for FTA research on FLEGT in Central Africa.....	77
Figure 12. Cluster ToC for FTA research on Sustainable Forest Management in Mozambique	79
Figure 13. Cluster ToC for FTA research on Timber Markets in Sub-Saharan Africa.....	81

List of Boxes

Box 1. REDD+ in Indonesia, a deep dive	22
Box 2. REDD+ in Vietnam, a deep dive.....	24

List of Acronyms

3E	Effective, Efficient, Equitable
ACOFOP	Association of Forestry Communities of Petén (Guatemala)
AF	Agroforestry
AFC	Agroforestry concession
AFDB	Beyond Timber: Reconciling the Needs of Logging Industry with those of Forest-dependent People
AgFor	Agroforestry and Forestry in Sulawesi: Linking Knowledge with Action Project
ANCOVA	<i>Association Nationale du Collectif des Vendeurs et Assimilés de Bois</i> (National Association of Collective of Sellers and Assimilated Wood, Cameroon)
ANR	Assisted Natural Regeneration
ANTAV	<i>Association nationale des transformateurs artisans et vendeurs de bois débités</i> (National Association of Artisanal Processors and Lumber Sellers, Cameroon)
BRG	Peatland Restoration Agency (Indonesia)
BOKU	The University of Natural Resources and Applied Life Sciences, Vienna
CATIE	<i>Centro Agronómico Tropical de Investigación y Enseñanza</i> (Tropical Agricultural Research and Higher Education Center)
CBD	Convention of Biological Diversity
CFE	Community Forest Enterprise
CGIAR	Consultative Group on International Agricultural Research
CIFOR	Center for International Forestry Research
CIRAD	<i>Centre de coopération internationale en recherche agronomique pour le développement</i> (French Agricultural Research Centre for International Development)
CO ₂	Carbon dioxide
COCOBOD	The Ghana Cocoa Board
COMIFAC	Commission of Central African Forests
CONAP	<i>Consejo Nacional de Areas Protegidas</i> (National Council of Protected Areas, Guatemala)
COP	Conference of Parties
CRP	CGIAR Research Program
CSO	Civil society organization
CUF	CIFOR-USAID Fellowship
DEVCO	European Commission Directorate General for International Cooperation and Development
DFID	Department for International Development (United Kingdom)
DRC	Democratic Republic of Congo
DRYAD	Improving Livelihoods and Land Use in Congo Basin Forests - Financing Sustainable Community Forest Enterprises in Cameroon Project
EU	European Union
FAO	Food and Agriculture Organization
FCCC	Forests and Climate Change in Congo Project
FCM	Forest Concession Moratorium
FKPB	<i>Forum Komunikasi Perkebunan Berkelanjutan</i> (Sustainable Plantation Communication Forum, Indonesia)
FLEGT	Forest Law, Enforcement, Governance and Trade
FMS	Field Monitoring System
FODER	<i>Forêts et Développement Rural</i> (Forest and Rural Development NGO, Cameroon)
FOERDIA	Forestry and Environmental Research Development and Innovation Agency (affiliated with the Indonesian Ministry of Environment and Forestry)
FORETS	Formation, Recherche, Environnement dans la Tshopo Project
FORSIBU	Forum of Haze-Free Country (Indonesia)
FP	Flagship Program
FPDF	Forest Protection and Development Fund
FREL	Forest Reference Emission Level
FTA	Forests, Trees and Agroforestry (CRP)
GCF	Green Climate Fund
GCS	Global Comparative Study
GGGI	Global Green Growth Institute
GHG	Greenhouse gas

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

GIS	Geographic Information System
GLF	Global Landscapes Forum
GML	Governing Multifunctional Landscapes in Sub-Saharan Africa: Managing Trade-offs between Social and Ecological Impacts Project
GoI	Government of the Republic of Indonesia
GOLS	Governing Oil Palm Adaptive Landscapes
GoN	Government of the Kingdom of Norway
GoP	Government of Peru
GOPDC	Ghana Oil Palm Development Company Limited
Gt	Gigaton
HCV	High Conservation Value
ha	hectare
HoF	Head of Funds
ICCN	<i>Institut Congolais pour la Conservation de la Nature</i> (Congolese Institute for Nature Conservation)
ICRAF	World Agroforestry
IDO	Intermediate Development Outcome
IAM	Mozambique's Institute of Agricultural Research
INBAR	International Network for Bamboo and Rattan
INCAS	Indonesia National Carbon Accounting System
INDC	Intended Nationally Determined Contributions
IPCC	International Panel on Climate Change
IREDD+	Impacts of Reducing Emissions from Deforestation and Forest Degradation and Enhancing Carbon Stocks Project
IPB	<i>Institut Pertanian Bogor</i> (Bogor Agricultural Institute)
IPOP	Indonesian Platform on Oil Palm
ISPO	Indonesian Sustainable Palm Oil
ITPC	International Tropical Peatland Centre
IUCN	International Union for Conservation of Nature
KLHK	<i>Kementerian Lingkungan Hidup dan Kehutanan</i> (Indonesian Ministry of Environment and Forestry)
LoI	Letter of Intent
LORTA	Learning-Oriented Real-time Impact Assessment
LUWES	Land-Use Planning for Low Emission Developing Strategies
MARD	Vietnamese Ministry of Agriculture and Rural Development
M&E	Monitoring & Evaluation
MECNT	Ministry of Environment, Nature Conservation and Tourism (Democratic Republic of Congo)
MELIA	Monitoring, Evaluation, Learning and Impact Assessment
MINAM	<i>Ministerio del Ambiente</i> (Peruvian Ministry of Environment)
MINEPDEP	<i>Ministère de l'Environnement, de la Protection de la Nature et du Développement durable de la République du Cameroun</i> (Cameroonian Ministry of Environment, Nature Protection and Sustainable Development)
MINFOF	<i>Ministère des Forêts et de la Faune</i> (Cameroonian Ministry of Forests and Wildlife)
MINMAP	<i>Ministère des Marchés Publics</i> (Cameroonian Ministry of Public Procurement)
MINTP	<i>Ministère des Travaux Publics</i> du Cameroun (Cameroonian Ministry of Public Works)
MINPMEESA	<i>Ministère des Petites et Moyennes Entreprises, de l'Économie Sociale et de l'Artisanat</i> (Cameroonian Ministry of Small and Medium Size Enterprises, Social Economy and Handicrafts)
MLG	From Climate Research to Action under Multilevel Governance: Building Knowledge and Capacity at Landscape Scale Project
M(M)RV	Monitoring (Measurement), Reporting, and Verification
MoU	Memorandum of Understanding
NDC	Nationally Determined Contribution
NGO	Non-governmental organization
NAMA	Nationally Appropriate Mitigation Actions
NICFI	Norway's International Climate and Forest Initiative
NNR	Niassa National Reserve
OPAL	Oil Palm Adaptive Landscapes
PARA	Piloting Approaches to Rural Advisory Services in Support of Scaling of the Agroforestry Concessions Scheme in Peru Project

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

PERDA	<i>Peraturan Daerah</i> (Indonesian Provincial Regulation)
PERGUB	<i>Peraturan Gubernur</i> (Indonesian Governor Regulation)
PFES	Payment for Forest Environmental Services
PGIS	Participatory Geographic Information Systems
PIPPIB	<i>Peta Indikatif Penundaan Pemberian Ijin Baru</i> (Indicative Map Postponement of Granting of New Licenses)
PROFEAAC	<i>Promouvoir et Formaliser l'Exploitation Artisanale du bois en Afrique Centrale</i> (Promote and Formalise Artisanal Timber Production in Central Africa Project)
PROFORMAL	Policy and Regulatory Options to Recognise and Better Integrate the Domestic Timber Sector in Tropical Countries Project
RANKSB	<i>Rencana Aksi Nasional Perkebunan Kelapa Sawit Berkelanjutan Tahun</i> (Indonesian National Action Plan for Sustainable Oil Palm Plantations)
RBP	Results-based Payment
REDD+	Reducing Emissions from Deforestation and Forest Degradation
REDD-ALERT	Reducing Emissions from Deforestation and Degradation through Alternative Land-uses in Rainforests of the Tropics Project
REFORCO	<i>Appui à la politique Nationale de conservation et gestion des forêts et de la biodiversité en République Démocratique du Congo</i> (Support for the National Policy for the Conservation and Management of Forests and Biodiversity in the Democratic Republic of Congo Project)
RPP	Readiness Preparation Proposal
RSPO	Roundtable for Sustainable Palm Oil
SERFOR	<i>Servicio Nacional Forestal y de Fauna Silvestre</i> (National Forest and Wildlife Service of Peru)
SERNANP	<i>Servicio Nacional de Áreas Naturales Protegidas por el Estado</i> (Peruvian National Service of Natural Protected Areas)
SFE	Sustainable Forest Enterprises
SFM	Sustainable Forest Management
SFX	São Félix do Xingu (Brazil)
SGDRN	<i>Sociedade para Gestão e Desenvolvimento da Reserva do Niassa</i> (Society for the Management and Development of the Niassa Reserve)
SLO	System-level Outcome
SME	Small and medium enterprise
SPDA	<i>Sociedad Peruana de Derecho Ambiental</i> (Peruvian Society of Environmental Law)
SRE	Sustainability Research Effectiveness
SUCCESS	Support to the Development of Agroforestry Concessions in Peru Project
SWAMP	Sustainable Wetlands Adaptation and Mitigation Program
TFI	Task Force on National Greenhouse Gas Inventories
ToC	Theory of Change
UNFCCC	United Nations Framework Convention on Climate Change
UNIKIS	University of Kisangani
UNMUL	Mulawarman University (Indonesia)
USAID	United States Agency for International Development
USD	United States Dollar
VND	Vietnamese đồng
VNFF	Vietnam Fund for Forest Protection and Development
VPA	Voluntary Partnership Agreement
WWF	World Wildlife Fund
YPS	<i>Yangambi, pôle scientifique au service de l'homme et des forêts</i> (Yangambi, Scientific Center at the Service of Man and Forests Project)

1 Executive Summary

1.1 Introduction

The study “Outcome Assessment and Impact Estimation: FTA’s Research Contributions Addressing Accelerating Rates of Deforestation and Forest Degradation (Challenge 1)” is part of a series of integrative studies that aim to assess the extent to which the Forests, Trees and Agroforestry (FTA) CGIAR Research Program (CRP) has contributed to solutions that address key global challenges since the program’s inception in 2011. This report was prepared by FTA Monitoring, Evaluation, Learning and Impact Assessment (MELIA) specialists in CIFOR-ICRAF, Bioversity International, FTA, and in close collaboration with the Sustainability Research Effectiveness (SRE) team at Royal Roads University.

The FTA CRP represents a substantial investment of approximately 850 million USD over the past ten years. Its research agenda aimed to develop solutions to major societal problems as a way to contribute to developmental and environmental impacts on a large scale. In practice, FTA is an umbrella for different and often inter-related research initiatives. Over the last decade, hundreds of research initiatives have been implemented in diverse country contexts, policy and research environments, geographies, landscapes, and socioeconomic conditions of local communities, to address pressing issues related to forests, trees, and agroforestry. In 2016, at the beginning of Phase II, FTA set aspirational impact targets to which it aimed to contribute. Nearing the end of the program, this study seeks to evidence and understand the extent and nature of FTA’s contributions and the likelihood that the high-level targets will be realized over time. To do so, the MELIA team has focused its efforts on evidencing outcomes and laying the groundwork for estimating impacts of FTA’s research in addressing five distinct, albeit inter-related, areas or “challenges”.

These challenges were identified together with the management team and leadership of FTA, highlighting five important areas of commitments relevant to many countries and actors, donors’ priorities, the Sustainable Development Goals, the global forest goals, the CGIAR SLOs, and the FTA phase 2 proposal. The five challenges are as follows:

- Challenge 1: Accelerating rates of deforestation and forest degradation;
- Challenge 2: High prevalence of degraded land and ecosystem services;
- Challenge 3: Widespread unsustainable land use practices;
- Challenge 4: Persistent rural poverty with increasing levels of vulnerability; and
- Challenge 5: Rising demand and need for nutritious food for both current and future generations

These five challenges are not the sole issues that FTA tackles, but several are precursors to other issues. For instance, FTA also worked to address biodiversity loss and climate change through actions to address deforestation, land and forest degradation, and unsustainable land use practices. Therefore, the assessment around these five challenges can be seen as a first step of a wider assessment of other issues that FTA tackles. This report addresses FTA’s contributions to Challenge 1, while the other Challenges are assessed in separate reports using a similar methodology. Within this report, we conceptualize deforestation using FAO’s (2020) definition: “the conversion of forest to other land use independently whether human-induced or not, including permanent reduction of the tree canopy cover below the minimum 10% threshold, but excluding areas where trees have been removed as a result of harvesting or logging, and where the forest is expected to regenerate naturally or with the aid of silviculture measures” (p.6). Much of FTA’s work addressing this challenge is focused on the conservation and protection of peatlands, wetlands, and mangroves. Although these land-types do not fall entirely under the FAO definition of forests, they have been included within this outcome assessment due to the focus on the conservation of these land types which more closely aligns with the aims of Challenge 1.

1.2 Methods

The evaluative approach relies on the documentation of nested Theories of Change (ToC) for each of the five challenges, including underlying hypotheses of how and why intended changes are expected to happen. The ToCs link FTA’s research and engagement activities to actions taken by other actors in the system (from next users to

boundary partners to other users) and changes within the enabling environment. An iterative process for developing the overarching ToCs and cluster-level sub-ToCs is explained below.

Step 1. Mapping projects to frame FTA contributions to addressing the five challenges

In order to assess the importance and scale of FTA's contributions to address accelerating rates of deforestation and forest degradation, the evaluators first conducted a comprehensive review of projects and initiatives to map FTA contributions to the five challenges and identify bodies of research that have primarily focused on Challenge 1. The mapping exercise identified and grouped FTA's activities into research clusters by theme and geography for each challenge, informed by interviews and document review of project proposals, FTA's Flagships, operational priorities, and work plans. These research clusters¹ constitute key components of the ToC.

Step 2. Documenting composite overarching and sub-ToCs per challenge – the case of Challenge 1

All available information was used to retrospectively document² composite ToCs (i.e., combining ToCs for related projects and research initiatives) for each of the five challenges, as well as cluster-level ToCs nested within the challenge-level ToCs. Challenge 1's ToC is comprised of eleven clusters, representing 45 projects that have a primary focus on deforestation and forest degradation issues. They are led by FTA partner institutions (i.e., the Center for International Forestry Research (CIFOR), World Agroforestry (ICRAF), Bioversity International, the French Agricultural Research Centre for International Development (CIRAD), the Tropical Agricultural Research and Higher Education Center (CATIE), the International Network for Bamboo and Rattan (INBAR), and Tropenbos International). The total budget amount of these projects is USD 125million (USD 3.2million per project on average).

Step 3. Collating existing evidence to identify gaps and assess FTA's contributions to outcomes

Available evidence was collected and organized for each cluster to test each element in the ToCs. Critical data and knowledge gaps were also identified during this process. Additional data from external sources (e.g., semi-structured interviews with stakeholders, policy documents, etc.) were collected as needed to assess outcomes, estimate potential impacts using projections from available documentation and evidence, and make plausible connections between FTA's contributions to outcomes and the likelihood for potential impacts to be realized in the future. Data availability was a key challenge in this process, with substantial variability in the quality of reporting and records management from project to project.

Step 4. Assessing FTA contributions to outcomes

The cluster ToCs, corresponding outcomes, and underlying assumptions were tested using empirical data identified through the mapping process, further desk research of project documents and reporting, and follow-up discussions with key scientists. Several impact pathways have been identified through this process. When possible, bibliometrics were collected to illustrate uptake and use of FTA outputs to supplement evidence of outcomes in the knowledge generation pathway.

Step 5. Deep dive analysis

One cluster (REDD+ global) was selected for more detailed analysis in a 'deep dive' case study to explore policy contributions, practice influence, and potential impact (see Boxes 1 and 2). Although it was clear from an initial review of evidence sources that FTA had contributed to and supported policies in Indonesia and Vietnam to address accelerating rates of deforestation and forest degradation, several evidence gaps remained and further

¹ The term 'cluster' has a specific unique meaning (related to the challenge ToC); it is not the same as the "cluster of activities" identified in the Flagships.

² Part of the "construction" of these ToCs can be seen as a step within the learning loop to periodically revisit the ToCs of the program. However, our process went a step further because of the extent of the reorganization around the five high-level challenges. For instance, FTA's Phase II did have a generic global ToC for the whole program, with a corresponding ToC by Flagship, but neither of these pre-existing ToCs could be used for the purpose of this detailed and cross-cutting investigation around the five challenges.

evidence from key stakeholders was needed. We filled these gaps using seven key informant interviews and further document review (e.g., project documents, policy documents, presentations, websites, webinars, etc.).

Step 6. Impact estimation

The impact metrics for Challenge 1 were defined based on the first set of end-of-program outcomes, intermediate development outcomes (IDO), SLO targets identified in FTA's Phase II proposal (Table 2). Therefore, two metrics were assessed for contribution to this challenge: 1) hectares of forests and peatlands under enhanced protection from deforestation and degradation as a result of collective processes to which FTA's research and engagement contributed; and 2) amount of CO₂ emissions in Gigatons (Gt) potentially avoided as a result of FTA's contributions to enhanced forest protection. Seven of the eleven clusters had quantitative estimates available for a range (low- and high-end) of impact potential and/or evidence of impact achievement³, while four clusters had no reporting of potential impact metrics within Challenge 1. However, the potential impact of these four clusters (SFM in Congo Basin, FLEGT/VPA, SFM in Mozambique, Timber markets in Sub-Saharan Africa) have been captured within the other four Challenge assessment reports using different metrics.

1.3 Challenge 1 Theory of Change

An overarching theory of change (ToC) as well as eleven cluster-level ToCs, representing 45 projects, were developed retrospectively based on data collected through interviews and desk review. The logic of the ToC is the following: FTA tried to tackle the key drivers of deforestation and forest degradation, such as poor forest management and lack of transparency of information and governance, by:

- Providing knowledge that frames issues
- Generating data on forests to understand current conditions and trends over time
- Developing policy solutions and innovations
- Offering guidance and support for implementation, and/or social process contributions via capacity-building and targeted engagement to multiple actor groups through different processes.

FTA's research and engagement efforts aimed to contribute to the reduction of deforestation and forest degradation by informing and influencing a wide range of actors, from researchers to governmental policymakers, NGOs, boundary partners and allies, the public, as well as corporate and small-scale private sector actors. Over the course of the last ten years, FTA aimed to contribute to enhanced forest protection through:

- The establishment of better regulated conservation areas (such as in the Congo Basin, Guatemala, Indonesia, Mozambique, Nicaragua, and Peru)
- The improvement of forest monitoring systems and market function (such as in Cameroon, the DRC, and Ghana)
- The improvement of REDD+ policies and practices (such as in Brazil, Cameroon, DRC, Ethiopia, Indonesia, Peru, Tanzania, and Vietnam)
- The prevention of instances of forest fires (such as in Indonesia)
- The reduction of agricultural expansion into natural forests for cash crop production (such as in Indonesia and Peru)⁴

FTA aimed to realize these intended changes by contributing in various ways to influence international instruments, policies, and standards related to the protection of forests (e.g., REDD+, the global forest goals, Green Climate funds, etc.), either by direct partnership with the UN agencies in charge (e.g., in writing the guidance for the forest sector for the Green Climate Fund) or through policy reports that were then taken up to diverse extent by international processes, as well as through evidence-based advocacy and engagement in various

³ Low-end potential estimates represent a conservative estimate and do not represent all FTA interventions, only for interventions where quantifications were available. High-end estimates represent a more liberal estimate but also do not represent all FTA interventions, only those interventions where quantifications were available and where further exploration highlights FTA's contributions to policies focused on landscape management and monitoring.

⁴ The full list of countries in which FTA research on Challenge 1 took place can be found disaggregated by cluster in Appendix 1.

platforms and events where commitments were made and action plans devised (e.g., forest action days of the UNFCCC COPs, COFO, etc.). It was intended that these actions would contribute to a better enabling environment for change in the countries where FTA projects operated as well as beyond⁵.

1.4 Results

The assessment indicates that FTA made notable achievements to influence policies (e.g., Global, Indonesia, Vietnam), practices (e.g., Peru, Ghana), and the research agenda (e.g., Nicaragua, Ghana, DRC) that contribute to reductions in deforestation and forest degradation. Some examples include: a new Forest Law in Cameroon informed by FTA research; the strengthening of the national Payment for Forest Environmental Services (PFES) policy in Vietnam through the establishment of a Monitoring and Evaluation (M&E) system; FTA contributions to the 2011 Forest Concession Moratorium (FCM, renamed PIPPIB in 2019) in Indonesia; support to Indonesia's Forest Reference Emission Level (FREL) through refined greenhouse gas (GHG) accounting in wetlands; contributions to the development of the Intended Nationally Determined Contributions (INDC) in Peru and Colombia; building capacities and supporting local people, communities, and small and medium enterprises (SMEs) to take up and practice more sustainable agricultural practices, timber extraction, and forest management; increasing research and organizational capacity for monitoring and verification (e.g., forest cover); and influencing national and global research agendas for enhanced focus and momentum on the topic of deforestation and forest degradation.

In the eleven research clusters assessed to date (7 of which have impact quantifications available), covering 45 projects and initiatives, we estimate between 25.6 million ha (low-end) and 133.4 million ha (high-end) of forests are potentially under enhanced protection from deforestation and degradation as a result of collective processes to which FTA research and engagement contributed. Based on these estimates, between 24 Gt of CO₂ (low-end) and 125.3 Gt of CO₂ may be avoided as a result of FTAs contribution to enhanced forest protection⁶. However, the realization of higher-level outcomes and impacts rest on a number of assumptions including the continued successful implementation and enforcement of policies, and compliance with such policies by the private sector, and all actor groups who have received training and capacity-building continuing to leverage their knowledge and relationships and apply their skills in their work. Assumptions were sustained to various degrees depending on their geographical context.

1.5 Limitations

The evaluators encountered obstacles over the course of the evaluation, which imposed limitations on the process and the findings. It is worth noting that the FTA centre- and partner-level project information databases vary in terms of completeness, which made the mapping exercise challenging⁷. Many projects had no explicit ToC

⁵ This important way of action is however more difficult to quantify as it is an indirect, enabling action, and it is not captured in quantitative estimates of impact in the present study. It remains however an important dimension of the work that contributes *de facto* to the realization of some important enabling hypotheses underlying the impact pathways in FTA's ToC, but also underpinning transformational change in general.

⁶ Potential impact estimations for CO₂ emissions were calculated using a standardized equation for tropical forests. This CO₂ equation holds caveats regarding differences in land-types across multiple geographies and oversimplifies the amount of potential emissions avoided (e.g., some ecosystems will emit more CO₂ than others when deforested). Owing to limitations in the data as well as resource limitations, it was not possible to identify all potential land-types and complete more accurate CO₂ emission estimations. The conversion equation used was taken from a study of undisturbed forests in Sumatra (Murdiyarso et al., 2002) and recommended for use by CIFOR scientists as the most appropriate method for generalizing emissions. Therefore, there is much nuance in reporting potential CO₂ emissions levels which may be over- or under-estimated depending on land-type and geography. Although not accurate, we deemed it important to calculate and present approximate figures for CO₂ emissions avoided as a key focus and outcome of FTA's work.

⁷ For bilateral projects, these were devised and inserted into the program following a dialogue between the lead investigator, Flagship leader, and program leadership (n.b., a key requirement for this process in Phase II was the contribution of the bilateral project to one of the 25 operational priorities of the program and their linkages with the operational priorities 3-year workplans). However, specific ToC requirements and sometimes even the existence of a project ToC were primarily dependent on conditions imposed by the bilateral

narratives or models already documented, hence substantial desk review and a targeted series of interviews were required to situate these projects in the composite models. As a consequence, not all of FTA's interventions could be captured; hence, the reported estimates do not reflect FTA's entire contribution that addresses the challenge, but rather a selection of well-documented research initiatives. Developing the composite ToCs was also challenging because of the variable levels of project-level and MELIA reporting. Some connections and pathways between research efforts and outcomes were unclear, and the use of MELIA terms was inconsistent across reporting.

Accessing further qualitative evidence (e.g., interviews) was not possible in some cases due to the COVID-19 pandemic and – in few instances – due to national government constraints, resulting in a small number of responses within the deep dive analysis. Snowballing to identify interview respondents may also have introduced the risk of bias, and recall of project details may have been challenging due to the time that has passed (as many projects were launched during Phase I); therefore, triangulation with available documentation and further review of external evidence (e.g., government policy documents) was undertaken. Furthermore, the ways in which FTA projects report on their contributions and achievements are largely inconsistent, making the review and analysis of available evidence an arduous task. This was particularly apparent in reporting for multi-country projects and programs, where often reported evidence is not disaggregated by study sites, let alone by country which made testing the ToC logic challenging. Few projects presented impact targets or reported on expected or potential impacts. Moreover, there were difficulties in separating outcomes and impacts between clusters where FTA's work on reducing deforestation and forest degradation was closely aligned and overlapped in terms of project topics, geography, actors engaged, and intended outcomes, as well as the confluence of external dialogues and fora on inter-related issues and initiatives. For example, there may be overlap between the outcomes within the REDD+ and Wetlands cluster in Indonesia, as both clusters' outputs and engagement contributed indirectly to the PIPPIB. The evaluators attempted to minimize the risk of overlap by separating land types where possible. Using a standard formula to estimate potential impact of CO₂ emissions avoided does not capture differences in land-types and therefore comes with its own nuances.

The limitations that emerged from the evaluative process informed a set of lessons to improve future MELIA practices as well as lessons for the implementation of change-making research on the topic of unsustainable land use practices, governance, and landscape management.

1.6 Lessons Learned and Recommendations

This report discusses lessons learned for consideration regarding the impact pathways of FTA's research on deforestation and forest degradation assessed to date, as well as some key recommendations to enhance the MELIA of similar research-for-development projects. All impact pathways are primarily focused on developing research, dissemination of knowledge, and supporting the uptake of results.

Lessons Learned for Research in Deforestation and Forest Degradation

Knowledge generation pathway:

- It was a common denominator to most clusters under Challenge 1 to utilize a knowledge generation pathway to contribute to outcomes and impacts. FTA Centers and partners are research organizations; therefore, much of FTA work focuses on the development of knowledge that can be taken up and used by stakeholders. FTA also works to build the capacity of researchers, local universities, government research agencies, and international research organizations to advocate for science-based decision-making and advance research on the topic.

grant. FTA did not seek to superpose or impose specific ToC requirements to bilateral projects (as this would have been too costly or even difficult to negotiate).

- With much deforestation resulting from land use change, particularly to agriculture (e.g., oil palm), future work on combatting deforestation and forest degradation should make links with the agriculture sector, including policy development and implementation. This could be considered when planning future projects and programs through finding and collaborating with partners engaged in global agriculture.

International and national government pathway:

- With frequent government turnover, knowledge can be lost, particularly when restructuring occurs. Creating accessible databases and continuing to prioritize individual and organizational relationship-building with governments were a few ways in which FTA attempted to ensure momentum continues and collaboration and trust remains.

International and national policy pathway:

- Contributing to national and international policy is a predominant means in which FTA contributes to impact that reduces deforestation and forest degradation. Many of the other impact pathways intersect with and are influenced by policy change on the topic. For example, implemented policies to address accelerating rates of deforestation and forest degradation can ensure private actors change their ways of working to more sustainable forest management practices.
- Providing national and international policymakers with knowledge and training through collaborative processes strengthened the capacities of policymakers to implement sustainable change. Engaging policymakers and decision-makers in multi-stakeholder dialogues to identify policy priorities, responsibilities, and implementation methods served to build coalitions and ensured research outputs were appropriate for use and aligned with government/political concerns.
- Research projects led by scientists with established positive relationships with policymakers were more likely to contribute to policy outcomes. Positive pre-existing relationships supported knowledge-sharing and trust in research outputs to support their uptake and use within national policy (e.g., REDD+ Indonesia).
- Aligning the research with parallel issues supported the uptake of research outputs by policymakers and placing issues on the political agenda. For example, in Peru, by aligning research findings with national objectives for climate change, FTA captured government attention and framed the AFC mechanism for widespread uptake and implementation across the country. Future research can utilize this method to ensure the use of project outputs.
- Policy outcomes rely on continuous promotion and use of research outputs by institutions and decision-makers to influence legislations and regulations on deforestation and forest degradation. FTA supported this through ongoing institutional and individual relationships with policymakers, actors, and departments which were stronger in some geographies than in others (e.g., in locations where centres have offices).

Partner/ally pathway:

- Leveraging and strengthening partnerships with a wide range of different organizations and institutions was a key method through which FTA was able to share knowledge and build capacities to support changes in knowledge, attitudes, and skills. Strong and appropriate partnerships also supported the use of FTA research and tools by stakeholders to make better evidence-based decisions. The realization of high-level outcomes and impacts rest on the assumption that partners continue to advocate for change, therefore, future research should continue to support partners and be systematic in how partners are chosen.

Private sector pathway:

- Strategically engaging private sector actors and equipping them with knowledge and capacities supported practice change to minimize deforestation and forest degradation in some contexts. Information that was shared in media appropriate for the private sector supported the use of outputs.

Smallholder and community pathway:

- Community engagement, participatory activities, and presenting knowledge in ways that are appropriate for the target audience increased the utility of the research process and FTA's outputs for smallholders and communities to build understanding and apply in their local context.
- Short-term projects experienced more challenges in trust-building and behaviour change amongst forest communities and smallholders.

Donor/Investor pathway:

- Including donors in discussions and decision-making from program start through to completion increased their access to data and their capacity to address deforestation and forest degradation issues through allocating more funding for the topic. In some cases, this helped bring more alignment, continuity, and sustainability to FTA's interventions.

Public pathway:

- The public pathway was not as prevalent within FTA's research on deforestation and forest degradation topics. However, targeted dissemination through national media and working through NGOs who acted as advocates to garner public attention on deforestation-related issues were effective means to raise public awareness and support in some projects (e.g., Fire and Haze in Indonesia).

Recommendations for Enhanced MELIA

1. *Use nested ToCs to support challenge-centric program and strategy design.* Researchers and program managers should fully utilize ToC as a core element of strategic project planning and adaptive management to guide program management and support the collection of outcome and impact data for evaluation. Future research-for-development programs should be guided by the value offer of purpose-driven central coordination for impact, which can be informed by explicit and well-developed ToCs.
2. *Aim for consistent documentation of projects' outcomes and influence across participating centres.* Implement a transparent monitoring and evaluation process from start to finish for all research projects or programs. Aim to quantify and report targeted intended outcomes and impacts at both the project and program-level (e.g., flagship-level). Disaggregated MELIA data on gender and youth promotion shall be collected in projects, which may have an effect on these two fields
3. *Strive for consistency in the application of monitoring and evaluation concepts.* We recommend enhanced capacity-building for FTA researchers on MELIA definitions, to ensure consistent understanding, use, and application of these concepts.

2 Introduction

As an integrated program, the Forests, Trees and Agroforestry (FTA) program is particularly challenging to evaluate. It comprises five distinct research themes (i.e., Flagship Programs (FPs)), and each FP comprises multiple projects, most of which are funded bilaterally. Moreover, the funding from Windows 1 and 2⁸ targets a set of 25 demand-driven operational priorities focused on different areas of the program. Arguably, therefore, FTA can be characterized as an umbrella for several distinct, albeit inter-related, research initiatives. However, as with Grand Challenge Programs and other large transdisciplinary programs, FTA is expected to devise solutions to pressing societal problems and, in turn, contribute to tangible developmental and environmental impacts on a large scale. These expectations (Table 1) manifested in a set of objectives contributing to the ambitious targets (set in 2016) that the CGIAR is expected to deliver by 2022:

- 31 million more farm households have adopted improved varieties, breeds or trees, and/or improved management practices
- 19 million people, of which 50% are women, helped to exit poverty
- Improve the rate of yield increase for major food staples by 0.1845%/year
- 17 million more people, of which 50% are women, meeting minimum dietary energy requirements
- 0.225% increase in water and nutrient (inorganic, biological) use efficiency in agroecosystems, including through recycling and reuse (same target)
- Reduce agricultural-related greenhouse gas emissions by 0.2 Gt CO₂-e year (yr) compared with business-as-usual scenario in 2022
- 30 million ha degraded land area restored
- 2.5 million ha of forest saved from deforestation⁹

Table 1: FTA's Expected Results (as noted in FTA's Phase II Proposal)

End of Program Outcomes	Intermediary Development Outcomes (IDOs)	System-level Outcome (SLO) Target	FTA Target Contribution
1. 25 countries improve governance mechanisms, institutions & tools for a) safeguarding forests/tree diversity and b) equitably managing forests & trees within mosaic landscapes	1. Improved ecological integrity, equitable mgt. & protection of forests & non-forest-based tree resources (IDOs 3.1 & 3.3)	1. 100 million more farm households have adopted improved varieties, breeds or trees, and/or improved management practices	1. 31 million
2. About 20 multinational companies and 500 private sector actors pursue models & investments for a) improved mgt. & safeguarding of forest & tree resources and b) enhancement of inclusive landscape-based livelihoods & ecosystem services	2. Enhanced ecosystem service provision (e.g., carbon storage, nutrient cycling, water filtration & soil health) (IDOs 2.3 & 3.2)	2. 30 million people, of which 50% are women, helped to exit poverty	2. 19 million
3. National and sub-national public & private sector actors in 25 countries deliver more effective & equitable	3. Increased resilience of female, male & poor smallholders & other forest/tree users to	3. Improve the rate of yield increase for major food staples from current <1% to 1.2-1.5% per year	3. 0.1845%
		4. 30 million more people, of which 50% are women, meet minimum dietary energy requirements	4. 17 million
		5. 5% increase in water and nutrient (inorganic, biological) use efficiency in agroecosystems,	5. 0.225%
			6. 0.2 Gt CO ₂ -e yr ⁻¹
			7. 30 million
			8. 2.5 million

⁸ Funders contribute to CRPs either through the CGIAR Trust Fund or bilaterally. Funders that contribute to the CGIAR Trust Fund designate their resources to one or more of three System funding Windows: *Window 1*- Contributions are received from Funders without restriction. The System Council sets priorities and decides how Window 1 funds are distributed to lead Centers of CGIAR Research Programs (CRPs) or Platforms and to provide cash-flow to System entities. These are pooled funds, which means that the source of funding that is distributed to Centers cannot be individually identified. *Window 2*- Contributions are designated by Funders to specific CRPs or Platforms. *Window 3*- Contributions are allocated to specific Centers by Funders.

⁹ These targets set in 2016 were developed prior to the identification of the five challenges, therefore, they are not entirely aligned. For example, deforestation alone is referred to within the above targets, while Challenge 1 is focused on both deforestation and forest degradation.

tree related breeding, delivery, extension & pedagogical services		climate change & other shocks (IDO 1.1)	including through recycling and reuse (target same)	
4. At least 40 million smallholders & other users access more productive tree planting material & uptake higher performing, context appropriate & inclusive AF & small-scale forestry mgt. option	4.	Productivity, food & nutritional security & incomes for female, male & poor smallholders & other forest/tree users (IDOs 1.2-1.4, 2.1)	6. Reduce agricultural-related GHG emissions by 0.2 Gt CO ₂ -e yr ⁻¹ (5%) compared with business-as-usual scenario in 2022	
			7. 55 million ha degraded land area restored	
			8. 2.5 million ha of forest saved from deforestation	

The causal links between research and impact are long and complex, making it difficult to precisely measure FTA's contribution to the above targets. Therefore, to generate evidence of contributions to these targets, an integrated impact estimation strategy was developed. This strategy considers that FTA addresses five challenges:

- Challenge 1: Accelerating rates of deforestation and forest degradation;
- Challenge 2: High prevalence of degraded land and ecosystem services;
- Challenge 3: Widespread unsustainable land use practices;
- Challenge 4: Persistent rural poverty with increasing levels of vulnerability; and
- Challenge 5: Rising demand and need for nutritious food for both current and future generations

To address each of these challenges, multiple strands of research are being spearheaded by various global, regional, and country research teams. Assessing both the importance and scale of the challenges (as they manifest in the contexts in which FTA operates) as well as documenting and evaluating what has been done to address the challenges are expected to support two objectives: i) the generation of coherent 'impact narratives' on what FTA and its partner institutions (i.e., the Center for International Forestry Research (CIFOR), World Agroforestry (ICRAF), Bioversity International, the French Agricultural Research Centre for International Development (CIRAD), the Tropical Agricultural Research and Higher Education Center (CATIE), the International Network for Bamboo and Rattan (INBAR), and Tropenbos International) have done and are doing to address some of the most pressing challenges of our times; and ii) the estimation of outcomes and impacts of this work.

This report focuses on outcome evidencing and impact estimation for Challenge 1 (Accelerating Rates of Deforestation and Forest Degradation). We conceptualize deforestation using the Food and Agriculture Organization's (FAO) (2020) definition, being: "the conversion of forest to other land use independently whether human-induced or not, including permanent reduction of the tree canopy cover below the minimum 10% threshold, but excluding areas where trees have been removed as a result of harvesting or logging, and where the forest is expected to regenerate naturally or with the aid of silviculture measures" (p.6). The term also includes areas where the impact of disturbance, over-utilization, or changing environmental conditions affects the forest to an extent that it cannot sustain canopy cover above the 10%. As a large proportion of FTA's work is focused on the conservation and protection of peatlands, wetlands, and mangroves, these land-types have also been included within this report. Although these land-types do not entirely fall under the FAO definition of 'forests', given FTA's protection-focused work and some difficulties in mapping projects to the five challenges, it was decided that these clusters of projects would best fit under Challenge 1. Within this report, we quantify impacts using two metrics: 1) hectares (ha) of forests under enhanced protection from deforestation and degradation as a result of collective processes to which FTA's research and engagement contributed; and 2) amount of CO₂ emissions (Gigatons (Gt)) better prevented from being released into the atmosphere due to the enhanced protection of forest areas to which FTA research contributed. We begin by describing the methods and process for outcome evidencing and impact estimation. We then present the overarching Theory of Change (ToC) for Challenge 1, and report on results of FTA's contributions to address deforestation and forest degradation in terms of outcomes realized and impacts estimated for each cluster of work under Challenge 1. The following section leads into a discussion of the lessons to date in terms of common and distinct barriers encountered through the assessment processes for the Challenge under review.

3 Methods

This study examined whether and how FTA contributed to changes in governmental (subnational, national, and international) and organizational policy and development practice that would influence social and environmental change in the contexts where FTA's research operates and beyond. The assessment uses a theory-based evaluation approach (Belcher, Davel, & Claus, 2020) to model collective FTA activities and outputs as well as intended outcomes and impacts, and to estimate potential FTA contributions to the aforementioned impact targets (Table 1).

The assessment investigates how FTA generated new knowledge, attitudes, skills, and relationships among key actors to enhance the protection of forests from deforestation and forest degradation (Challenge 1), restore degraded land and ecosystem services (Challenge 2), address unsustainable land use practices (Challenge 3), give people means to exit poverty (Challenge 4), and improve food security and nutrition (Challenge 5). The objective of this report is to critically assess the portfolio of FTA's research for Challenge 1 by collecting and analyzing information about its activities, outputs, and outcomes to provide plausible impact estimates, as well as support learning for research effectiveness and impact.

The assessment is guided by the following questions:

1. Research Outcome Evaluation: To what extent and how did FTA's research portfolio realize outcomes in each of the five challenges?

- i. *What is the evidence that outcomes have been realized?*
- ii. *Could the outcomes have been realized in the absence of FTA?*
- iii. *Were there any positive or negative unexpected outcomes?*
- iv. *Were the ToC assumptions valid?*

2. Impact Estimation: What is the scope and scale of impacts to which FTA's research portfolio has contributed for each of the five challenges?

- i. *What is the spatial location and extent where the impact has the potential to be realized?*
- ii. *What plausible ranges of effects have and are likely to manifest (e.g., reduced carbon emissions per ha; increased income per household)?*
- iii. *What key assumptions are required to estimate the potential impact?*
- iv. *How sensitive is the estimation to varied assumptions?*

The assessment uses a set of composite ToCs as the main analytical framework. A ToC is a set of projected causal relations, hypotheses, and assumptions that describe and model how and why a project or program is expected to contribute to a change process. The ToC details the main activities and outputs, identifies key actors involved in the change process, specifies their actions as a sequence of steps or stages (i.e., outcomes) in the process, and exposes the theoretical reasoning for the expected changes (Earl, Carden, & Smutylo, 2001; Vogel et al., 2007). The ToC aims to explain who (i.e., individuals and organizations) is expected to do what differently and why as a result of FTA's research and engagement. Given that FTA's work is diverse and comprises numerous individual research-for-development projects, efforts were made to systematically document what work has and is being undertaken vis-à-vis each challenge. The iterative process for developing the overarching ToCs and cluster-level sub-ToCs is explained below.

Step 1. Mapping projects to frame FTA contributions to addressing the five challenges

As an overarching FTA-level ToC did not exist to guide FTA's programs for each of the specific challenges, the first step was to retrospectively map a selection of FTA projects and initiatives to the five challenges. This was to an extent facilitated by the use of the FTA operational priorities and list of contributing projects, and complemented by interviews of Flagship (FP) leaders and scientists. Owing to the integrative nature of the challenges, many projects could relate to one or more of the five challenges, so primary and secondary challenge categories were mapped by project when possible. This first step defined preliminary research clusters by theme and geography. 45 projects were identified as primarily focusing on Challenge 1.

Step 2. Documenting composite overarching and sub-ToCs per challenge – the case of Challenge 1

The evaluation team undertook a thorough desk review of project materials mapped to the Challenge 1 and consulted with scientists and Flagship leaders to guide the development of the ToC logic models. Some projects had explicit ToCs documented (mostly projects with a more recent start date), but most had only implicit or very general ToCs available. Key ToC components were mapped in a database to identify key activities, outputs, outcomes, and potential impacts at the project-level. Population of the database and the mapping exercise enabled the evaluation team to first organize ToC components by project and then group similar projects by topic and/or geography into distinct clusters within the database. For example, clusters of projects addressing particular sub-challenges (e.g., fire and haze, REDD+, FLEGT, etc.) were identified through this process. Clusters could also be specified by the location of the research and engagement and by the intended application domain; that is, where the intended outcomes and impacts were expected to manifest (e.g., extensive research efforts on sustainable forest management (SFM) have been supported by FTA, but in different geographies such as Mesoamerica, the Congo Basin, and Mozambique that each aim to influence different actor groups and processes specific to each region).

Eleven clusters were identified for Challenge 1. Following the clustering of projects, ToC components were aggregated to conceptualize the key activities, knowledge and social process contributions, outcomes, and potential impacts for each cluster, resulting in a cluster-level sub-ToC. Cluster-level sub-ToCs were sufficiently broad to convey the logic of the challenge, with specific project-level details mapped within each component (Challenge 1's clusters' ToCs have been documented in the online platform¹⁰ and can be found in Appendix 1). Further aggregating the clusters' sub-ToCs, it was possible to derive an overarching ToC and narrative for the challenge (see Miro). This was an iterative process, which enabled subsequent identification and integration of additional projects (and clusters) that could be mapped to the challenges. This analytical framework provided the structure for a review of available evaluation reports, project documents, and other data to both provide evidence to test the ToCs and identify gaps to inform the empirical data collection phase, which are further described in the following steps.

Step 3. Collating existing evidence by challenge to identify gaps

Over the last decade, FTA has commissioned theory-based evaluations and impact assessments of several of its projects, which provided an initial base of evidence that could be built upon in this study. In order to identify where the existing evidence base was strong and where additional empirical evidence needed to be collected to fill gaps, we mapped the available evaluation evidence (i.e., use/uptake of outputs, outcomes, impacts) and systematically reviewed and appraised evidence for each project. In cases where external evaluations were not available, other documents were reviewed to collate available evidence or indications of potential evidence (e.g., annual reports, outcome stories, midterm/final reports, peer-reviewed articles, theses, briefs, etc.).

Evaluation evidence sources for Challenge 1 included:

- 13 evaluation reports
- 3 FTA annual reports
- 6 CIFOR annual reports
- 1 Bioversity International annual report
- 5 outcome stories
- 32 midterm reports
- 17 final reports
- 17 peer-reviewed articles
- 4 briefs
- 9 webpages
- 1 blog
- 3 FTA press releases
- 1 external press release
- 2 technical reports
- 6 presentations/webinars
- 22 project proposals/grant contracts
- 2 project logic frameworks/theories of change
- 5 policy/government documents
- 3 theses

Evidence sources were then assessed for reliability and confidence. The reliability of evidence sources was determined by an assessment of whether the source was internally produced (lower reliability) or conducted by an external evaluation or peer-reviewed (higher reliability). It was thought that external reports provide an additional level of quality control of the evidence. The confidence of evidence sources was determined by an

¹⁰ https://miro.com/app/board/o9J_lEN1rSk=

assessment of the quality of the evidence source (criteria included methodological approach (e.g., theory-based evaluation, quasi-experimental design), primary versus secondary/tertiary data collection, level of detail, indications versus clear realization, triangulation of evidence, etc.).

This exercise highlighted which clusters (and projects within those clusters) have: i) strong and likely sufficient evidence to make a reliable assessment; ii) key evidence gaps that are relatively low-hanging fruit to supplement; and iii) key evidence gaps that will be too time- and resource-intensive to assess. This enabled the evaluation team to prioritize which clusters (and/or projects to represent the clusters) across the challenge to focus on for additional empirical data collection and planning the next steps of the assessment process. An overview of the cluster appraisal during the evaluation exercise has been included in Table 2 below. The full table can be found in Appendix 3.

Table 2: Summary Cluster-level Appraisal Process of Evidence for Challenge 1

Cluster	Total Number and Assessment of Evidence Sources	Pathways with Strong Outcome Evidence	Pathways with Weak Outcome Evidence	Feasibility of Cluster Impact Estimation Assessment	Prioritization of Cluster for Additional Evidence Collection ¹¹
Global Comparative Study on REDD+ (9 projects)	17 sources (5 external evaluations, 1 masters thesis focused on evaluation, 3 outcome stories, 1 interim reports, 5 final reports, 2 proposals/grant contracts) <i>Reliability:</i> low for internal reports; high for external evaluations <i>Confidence:</i> medium for internal reports; high for external evaluations	Knowledge generation pathway: sufficient evidence for all GCS REDD+ project Phase 1, Phase 2, Phase 3 (half), and Benefit sharing mechanism project; other projects only identify expected outcomes. Update would strengthen International and national government pathway: as above	Partner/ally pathway: (have indications of potential outcome realization) Community pathway: (have indications of potential outcome realization)	Preliminary evidence makes it a promising case; possibility to draw on policy targets and previous evaluations	Prioritization: high <ul style="list-style-type: none">• Overlap in Challenges 2 and 3• Supports multi-regional representation• CIFOR and ICRAF representation• Representative of FTA and bilateral investment (total cluster budget >\$50m)• Preliminary outcome evidence is substantial and promising, but key gaps remain• Substantial impact contributions; impact estimations are possible, but require supporting evidence of outcome realization and projects' contributions to achievement of policy targets (assumptions must be explicit)
Role of Wetlands in Climate Change (5 projects)	23 sources (2 external evaluation articles, 1 masters thesis focused on evaluation, 1 brief, 15 interim reports, 3 project proposals/grant contracts, 1 final report)	Knowledge generation pathway: (only for SWAMP; other projects only identify expected outcomes) International and national policy pathway: (only for SWAMP; other projects only identify expected outcomes)	Private sector pathway (only evidence from 1 project) Partner/ally pathway (only evidence from 1 project)	Possibility to draw on policy targets; possibility to conduct an ex ante impact assessment? (e.g., Characterizing and Assessing Palm Swamp Degradation in the Peruvian Amazon Project)	Prioritization: medium <ul style="list-style-type: none">• No challenge overlap• Supports multi-regional representation• CIFOR representation• Representative of FTA and bilateral investment (total cluster budget >\$5m)

¹¹ A set of criteria was used to inform the prioritization assessment to enable strategic selection of clusters (and/or projects within a cluster) for additional evidence collection. These criteria include: potential overlap of cluster/project(s) for other challenges; geographic overlap and representation; FTA centre representation; pathway overlap; proportion of FTA and bilateral investment of cluster/project (i.e., prioritizing clusters/projects with larger budgets); likelihood for availability of outcome evidence; and likelihood for availability and/or feasibility to assess and quantify the scale of impact.

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

	<p><i>Reliability:</i> low for internal reports; high for external evaluations</p> <p><i>Confidence:</i> low to medium for internal reports; high for external evaluations</p>				<ul style="list-style-type: none"> • Preliminary outcome evidence for 1 project is substantial (e.g., SWAMP), but key gaps remain • Impact estimations are possible, but require supporting evidence of outcome realization and projects' contributions to achievement of policy targets (assumptions must be explicit)
Fire and Haze in Indonesia (3 projects)	<p>6 sources (1 outcome story, 1 performance story, 1 final report, 1 annual report, 1 article based on external evaluation, 1 theory of change)</p> <p><i>Reliability:</i> low for internal reports; high for external evaluation</p> <p><i>Confidence:</i> low for internal reports; high for external evaluation</p>	<p>International and national government pathway: (sufficient evidence; update would strengthen)</p> <p>Partner/ally pathway: (sufficient evidence; update would strengthen)</p> <p>Knowledge generation pathway: (sufficient evidence; update would strengthen)</p>	<p>Public pathway: (need more detail, update would strengthen)</p> <p>Smallholder pathway: (minimal preliminary evidence)</p>	Possibility to draw on policy targets	<p>Prioritization: medium</p> <ul style="list-style-type: none"> • Overlap in Challenges 2 and 3 • Overlap in region representation • CIFOR representation • Relatively small budget (total cluster budget <\$1m) • Preliminary outcome evidence for 1 project is substantial (Political Economy Study of Fire and Haze in Indonesia), but key gaps remain or require updated evidence • Impact estimations are possible, but require supporting evidence of outcome realization and projects' contributions to achievement of policy targets (assumptions must be explicit)

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

Agroforestry Concessions in Peru (3 projects)	3 sources (1 external evaluation, 1 internal outcome impact case report/external press release, 1 webpage) <i>Reliability: high</i> <i>Confidence: high</i> *1 project has no evidence sources (too young)	International and national government pathway: (sufficient evidence; update would strengthen) Partner/ally pathway: (sufficient evidence; update would strengthen)	Knowledge generation pathway: (update would strengthen) Smallholder pathway: (low preliminary evidence, update would strengthen)	1 project produced potential impact estimations	Prioritization: medium <ul style="list-style-type: none"> • Overlap in Challenges 2, 3 (deep dive case study), and 4 • Under-represented region • ICRAF representation • Representative of FTA and bilateral investment (total cluster budget <\$5m) • Outcome evidence for 1 project is substantial (SUCCESS), but key gaps remain or require updated evidence • Impact estimations are possible, but require supporting evidence of outcome realization and projects' contributions to implementation of a policy mechanism (assumptions must be explicit)
Sustainable Forest Management in Mesoamerica (1 project)	7 sources (1 interim report, 1 final report, 3 press releases, 1 external webpage, 1 project proposal) <i>Reliability: low/medium</i> <i>Confidence: low/medium</i>	Knowledge generation pathway: (need more detail) Community pathway: (need more detail) *evidence only for Guatemala component	International and national government pathway: (have indications of potential outcome realization) Partner/ally pathway: (need more detail)	Potential impact noted in self-reported source, triangulated with external sources	Prioritization: medium <ul style="list-style-type: none"> • Overlap in Challenges 3 and 4 • Under-represented region • Bioversity International representation • Relatively small budget (<\$1m) • Feasible (1 project to assess) • Preliminary outcome evidence is promising, but key gaps exist • Likely negligible impact contribution
Sustainable Forest Enterprises in Cameroon (1 project)	4 sources (1 blog, 1 presentation, 1 final report, 1 working paper) <i>Reliability: medium</i> <i>Confidence: high</i>	Community pathway: (sufficient evidence)	International and national government pathway: (limited evidence; more detail needed) Donor/investor pathway: (no evidence)	Target listed; some impacts reported	Prioritization: medium <ul style="list-style-type: none"> • Overlap in Challenges 3 and 4 • Overlap in region representation • ICRAF representation

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

			Partner/ally pathway: (limited evidence; need more detail)		<ul style="list-style-type: none"> • Representative of FTA and bilateral investment (budget <\$10m) • Feasible (1 project; though had recent reporting) • Preliminary outcome evidence is promising (strong for 1 pathway), but notable gaps exist • Impact estimations are possible, but require supporting evidence of outcome realization and project contributions (assumptions must be explicit)
Oil Palm in Indonesia (4 projects)	5 sources (2 external evaluations, 1 CIFOR annual report, 1 project proposal/grant contract, 1 final report) <i>Reliability: high</i> <i>Confidence: high</i>	International and national government pathway: (sufficient evidence) Partner/ally pathway: (sufficient evidence) Knowledge generation pathway: (sufficient evidence)	Private sector pathway: (minimal evidence)	Some impacts reported	Prioritization: low to medium <ul style="list-style-type: none"> • Overlap in Challenge 3 • Overlap in region representation • CIFOR representation • Representative of FTA and bilateral investment (total cluster budget >\$7m) • Outcome evidence is substantial and recent, but key gaps remain Impact estimations are possible, but require supporting evidence of outcome realization and projects' contributions to achievement of policy targets and/or corporate commitments (assumptions must be explicit)
Sustainable Forest Management in Congo Basin (6 projects)	12 sources (1 brief, 1 technical report, 2 interim reports, 3 final reports ,4 proposals/ grant contracts, 1 logic framework) <i>Reliability: low</i> <i>Confidence: low</i>	Knowledge generation pathway: (promising preliminary evidence of UNIKIS collaboration; need more detail) International and national government pathway: (preliminary evidence is promising)	Private sector pathway: (have indications of potential outcome realization) Community pathway: (outcome not applicable to projects with stronger evidence bases, but preliminary indications)	1 project had clear targets listed with indications of achievement (FCCC Project); possibility to make quantifications based on other project contributions (Yangambi)	Prioritization: medium <ul style="list-style-type: none"> • Overlap in Challenges 2 and 3 • Overlap in region representation • CIFOR representation • Representative of FTA and bilateral investment (total cluster budget >\$20m)

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

	*1 project has no evidence sources	Donor/investor pathway: (preliminary evidence is promising)	from other projects could be promising)	Project) (though likely negligible)	<ul style="list-style-type: none"> • Feasible if a strategic selection of projects is prioritized (e.g., FCCC Project, Beyond Timber Project) • Regional overlap to prioritize: DRC, Cameroon • Preliminary outcome evidence is promising, but key gaps exist • Substantial impact contribution, impact estimation is possible
FLEGT/VPA (7 projects)	<p>21 sources (8 interim reports, 1 technical report, 4 final reports, 1 external evaluation report, 5 project proposals/grant contracts, 1 brief, 1 presentation)</p> <p><i>Reliability: low (external evaluation: high)</i> <i>Confidence: low (external evaluation: high)</i></p>	<p>Knowledge generation pathway: (only for PROFORMAL Project; other projects only identify expected outcomes)</p> <p>International and national policy pathway: (only for PROFORMAL Project; other projects only identify expected outcomes)</p>	<p>Private sector pathway: (have indications of potential outcome realization)</p> <p>Smallholder pathway: (no preliminary evidence)</p> <p>Partner/ally pathway: (minimal preliminary evidence, needs follow-up)</p>	Some projections or targets are listed ¹²	<p>Prioritization: low</p> <ul style="list-style-type: none"> • Overlap in Challenges 3 and 4 • Overlap in region representation • CIFOR representation • Representative of FTA and bilateral investment (total cluster budget >\$15m) • More feasible if strategic selection of projects is prioritized (e.g., GLM, PROFORMAL Project) • Regional overlap to prioritize: DRC, Cameroon • Preliminary outcome evidence for 1 project is promising (e.g., PROFORMAL), but notable gaps exist for other projects • Impact estimations are possible, but require supporting evidence of

¹² Most of the impact estimations for the FLEGT cluster are derived from project outputs (i.e., findings of status of country FLEGT and/or changes over time pre- and post-FLEGT implementation); these impact numbers are not impact contributions of the projects, but may be possible to use to represent the cluster *if* the logic and supporting evidence can be made to show either: i) how these outputs were used by stakeholders to incentivize country investment in FLEGT/VPA mechanisms and/or policy development/implementation to reduce deforestation/illegal logging; or ii) linked FTA contributions to the design and implementation of FLEGT/VPA mechanisms/tracking and/or policy development/implementation to reduce deforestation/illegal logging.

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

					outcome realization and projects' contributions (assumptions must be explicit)
Sustainable Forest Management in Mozambique (1 project)	4 sources (1 interim report, 1 final report, 1 project proposal, 1 presentation) <i>Reliability: low</i> <i>Confidence: low</i>	Knowledge generation pathway: (need more detail) Community pathway: (need more detail)	International and national government pathway: (have indications of potential outcome realization)	No target(s) listed; possibility to make quantifications based on project contributions (though likely negligible)	Prioritization: low <ul style="list-style-type: none"> • Overlap in Challenge 3 • Unique region representation • Bioversity International representation • Support regional representation • Relatively small budget (<\$1m) • Feasible (1 project to assess) • Preliminary outcome evidence is promising, but key gaps exist • Likely negligible impact contribution
Timber Markets in Sub-Saharan Africa (4 projects)	9 sources (3 interim reports, 1 final report, 4 proposals/grant contracts, 1 presentation) <i>Reliability: low</i> <i>Confidence: low</i>	Minimal outcome evidence	International and national government pathway: (indications of potential outcome realization discussed for 1 project) Partner/ally pathway: (no evidence) Knowledge generation pathway: (no evidence) Private sector pathway: (indications of potential outcome realization discussed for 1 project)	No target(s) listed; does not seem possible	Prioritization: low <ul style="list-style-type: none"> • Overlap in Challenge 4 • Overlap in region representation • CIFOR representation • Relatively small budget (total cluster budget ~\$1.5m) • Minimal current evidence base for outcomes; would require intensive data collection • Low possibility to derive impact estimations • *If pursued, suggest strategic selection of projects with regional overlap (DRC, Cameroon)

Step 4. Assessing FTA contributions to outcomes

The cluster ToCs, corresponding outcomes, and underlying assumptions were tested using empirical data identified through the mapping process, further desk research of project documents and reporting, and follow-up discussions with key scientists. Key scientists and project staff also provided insight on other sources of evidence to test the realization of cluster outcomes. Sources were reviewed for evidence of outcomes and impacts by the MELIA team and triangulated against all available project data as well as relevant policy documents to assess their reliability and confidence in the information. The analysis explicitly recognizes that the relative influence of a project or program declines the further it moves from the project boundary (Belcher et al., 2020). For example, the influence of a research project declines as the project moves from its activities and produced outputs (sphere of control) to who they work with (sphere of influence) to the improved conditions it hopes to effect (sphere of interest) (Belcher et al., 2020). In recognition of the existence of external actors and processes contributing to the same outcomes as FTA, alternative explanations and discussion of the counterfactual are also highlighted when evidence was available. When possible, bibliometrics were collected to illustrate uptake and use of FTA outputs to supplement evidence of outcomes in the knowledge generation pathway.

Step 5. Cluster deep dive

Owing to the complexity of the FTA program in addressing Challenge 1, and the variable range of available evidence for each of the clusters as identified in Table 2, it was decided that one cluster would be analyzed in greater detail within a ‘deep dive study’ to explore policy contribution and potential impact of FTA work. Collecting evidence of the full set of identified clusters would not allow for delving into the details of the respective impact pathways due to the limited time and resources of the evaluation, diminishing the rigor of the analysis and hence accuracy of claimed effects on outcome and impact levels.

As a result, a thorough assessment was conducted to identify the most appropriate cluster candidate for an in-depth analysis of FTA’s work on deforestation and forest degradation. A set of criteria¹³ was used to support the appraisal and selection of deep dive candidates; upon application of these criteria, it became clear that no cluster would fully match all criteria. The cluster “REDD+” (comprising nine projects across 17 countries) was subsequently selected, representing a body of work which fulfills all criteria to a sufficient extent. For example, while most of the projects representing this cluster have a strong focus on deforestation, other challenges are also directly or indirectly addressed by the cluster (particularly Challenge 2: High prevalence of degraded land and ecosystem services; Challenge 3: Widespread unsustainable land use practices; and Challenge 4: Persistent rural poverty with increasing levels of vulnerability), revealing potential overlap of the cluster with other challenges. The overlap indicates the cross-cutting nature of FTA’s work to address these integrated challenges and was considered to supplement data availability for other challenges. There is also geographic overlap and representation with the nine projects under this cluster working globally in a multitude of countries (e.g., Vietnam, Indonesia, Peru, Brazil, Cameroon, etc.). The REDD+ cluster also represents a large budget and proportion of FTA investment, with evidence scoping exercises (including preliminary document review) revealing a strong likelihood for availability of outcome evidence due to pre-existing project evaluations and the time that has passed since the implementation of projects. This cluster therefore has a greater likelihood for the realization of potential outcomes and impacts than others.

As a global/multi-regional cluster, it is not possible to investigate all of FTA’s REDD+ interventions within the respective countries. Through an in-depth review of relevant documentation and scoping interviews with key scientists, it was decided to focus on FTA’s contribution to Indonesia’s Forest Concession Moratorium (FCM), which in 2019 was renamed *Peta Indikatif Penundaan Pemberian Ijin Baru* (PIPIB; Indicative Map Postponement of Granting of New Licenses) in primary forests and peatlands, as well as the monitoring system

¹³ A (tentative) set of criteria for this assessment were presented in the report “Outcome Evidencing and Impact Estimation: Progress on Challenges 1 & 5” (2020). Criteria included: potential overlap of cluster/project(s) for other challenges; geographic overlap and representation; pathway overlap; proportion of FTA investment of cluster/project (i.e., prioritizing clusters/projects with larger budgets); likelihood for availability of outcome evidence; and likelihood for availability and/or feasibility to assess and quantify the scale of impact.

of Vietnam's Payment For Environmental Services (PFES) (i.e., a policy learning tool designed for policymakers and government officers to complete Monitoring & Evaluation (M&E) and report on the progress and impact of PFES policies).

Evidence reviewed for the deep dive analysis included:

Interviews (7):

- FTA Key Scientists: 2
- Donor Governments: 1
- Government of Indonesia (GoI): 1
- Private Sector Indonesia: 1
- Regional/Local Government of Vietnam (Heads of Funds): 2

Document Review (26):

- FTA Project Documents: 12
- Master's Thesis: 2
- Web Pages: 6
- Government Documentation: 4
- Webinars and Presentations: 1
- External Reports: 1

Although it was clear from an initial review of available project documents that FTA contributed to policy change through the REDD+ program and the development of tools in both Indonesia and Vietnam to support the reduction of emissions due to deforestation and forest degradation, several evidence gaps in attribution were observed. In order to fill gaps, the following country-specific questions were identified:

Indonesia:

- To what extent and how (social process and knowledge contributions) did FTA contribute to the development, design, and implementations of Indonesia's PIPPIB?
- To what extent and how did FTA influence subsequent revisions and modifications of the PIPPIB?
- How did the PIPPIB affect policy or practice change within the Indonesian private sector?
- Are there any positive or negative unexpected outcomes of the PIPPIB (or FTA's work on REDD+ in Indonesia)?
- Discussion of the counterfactual, for example, what would have happened if FTA contributions to the PIPPIB did not occur?

Vietnam:

- How did the PFES system operate before and after the introduction of Decree 156 (the Law on Forestry) and M&E frameworks; did PFES payments change as a result?
- What are the main effects of the M&E framework since its introduction in 2017; did the M&E framework improve the accuracy of payments for improved land use practices?
- Did the M&E system affect how closely PFES payments are associated with forest protection or forest quality related activities?
- Have relevant actors (e.g., public and private forest users, environmental service providers, communities and household groups) adjusted their deforestation/afforestation activities as a consequence of PFES payments, and was this further strengthened due to changes of PFES payments after the introduction of the M&E system?
- How could the M&E system be improved?
- Discussion of the counterfactual, for example, what would have happened in the absence of the M&E system (and PFES)?

Step 6. Impact estimation

This step used evidence and information from the preceding steps to estimate plausible ranges of FTA's impact vis-à-vis the intended targets for each challenge, as well as other potential impacts including those that may be negative. We define impact as a change in state or a change in flow resulting in whole or in part from a chain of events to which research (or another intervention) has contributed (Belcher, Davel, & Claus, 2020). Impact can be economic, socio-cultural, institutional, or environmental.

The impact metrics for Challenge 1 were defined based on the first set of end-of-program outcomes, intermediate development outcomes (IDO), SLO targets identified in FTA's Phase II proposal (Table 2). As a result, impact

estimations are presented using a range between ‘low-end’ estimates and ‘high-end’ potential of (1) hectares of forests under enhanced protection from deforestation and degradation as a result of collective processes to which FTA’s research and engagement, and (2) potential amount of CO₂ emissions (Gt) prevented from being released into the atmosphere due to the enhanced protection of forest areas as a result of FTA’s contributions.

Potential impacts were estimated on the basis of projections and estimates from available documentation and evidence, making plausible connections between FTA’s contributions to outcomes and the likelihood for potential impacts to be realized in the future. The previous steps surfaced assumptions underpinning the documented impact targets and some preliminary projected impact figures. The impact estimation exercise explicitly identifies the underlying assumptions as part of the reasoning and demonstration of likelihood for impact realization. The method explicitly recognizes that there are alternative explanations for potential impact as multiple external actors are involved in the processes that contribute to changes in state or flow. We therefore realize FTA’s contribution to these changes, rather than direct attribution. Impact estimates are derived from the review of the existing evidence base (±80 documents) of the 45 projects mapped to Challenge 1. 23 of these projects had quantifications available of low- and high-end impact potential with varying degrees of reliability. FTA’s policy influence was explored in greater detail to assess the extent of FTA’s inputs and contributions to policy change and subsequently contributions to the realization of those policies’ impact targets for reduced deforestation and forest degradation.

For both metrics, estimations are taken from aggregating project-level information (i.e., the sum of projects’ low-end estimates and high-end potential) to derive the total estimated potential impact for the cluster, then the challenge. The low-end area estimations (and associated CO₂ emissions avoided estimations) represent a conservative estimate of FTA’s impact, and were classified based on:

- Area under and influenced by FTA projects (i.e., project study sites) (e.g., provinces in which FTA conducted research and supported an enhanced M&E system for PFES in Vietnam)
- Area of land newly covered under forest protection policies to which FTA directly contributed Area covered by national monitoring and evaluation systems to which FTA contributed

High-end areas (and associated CO₂ emissions avoided estimations) represent a more liberal estimate of *potential* impact, based on:

- Impact estimates and/or projections calculated by FTA projects (i.e., outputs)
- Maximum policy targets of policies that have evidence of being influenced by FTA (e.g., scaling up of policy to other regions and total amount of land covered under forest protection policies)
- Area of land that has the potential to be covered by monitoring and evaluation systems and tools if scaled up

Converting hectares saved from deforestation (low and high-end) to CO₂ emissions avoided was based on the following Co₂ conversion formula based on literature review and consultations with field experts:

$$CO_2[Gt] = \left((n \text{ ha} \times 254 \text{ tC/ha}) \times 3.7 \right) / 1,000,000,000$$

In this conversion, the number of hectares (ha) of better protected forests is denoted with n. 1 hectare of forest saved from deforestation (i.e., not being turned into cropland) is equivalent to the prevention of 254 tons of carbon per hectare¹⁴ being decomposed or burned. To convert the carbon stock into CO₂, the estimate was multiplied by a factor of 3.7.¹⁵

¹⁴ Cf. Murdiyarso, D. et al. (2002). Environmental benefits and sustainable land-use options in the Jami transect, Sumatra. See table 1 on p.435 for the carbon stock amount of 254 t/ha. This amount refers to the forest category “Natural forest, undisturbed for the last 100 years” (cf. *ibid.*, p.423, table 1).

¹⁵ Interview with CIFOR key scientist.

The potential amount of CO₂ emissions (Gt) prevented from being released into the atmosphere due to the enhanced protection of forest areas as a result of FTA's contributions was calculated based on the low-end estimates and high-end potential of the hectare ranges using a standardized equation for tropical forests. The CO₂ conversion formula holds caveats regarding differences in land-types across multiple geographies and oversimplifies the amount of potential emissions avoided (e.g., some ecosystems will emit more CO₂ than others when deforested). For example, some forests, particularly degraded ones, have a lower carbon density. Owing to limitations in the data as well as time and resources constraints, it was not possible to identify all potential land-types and complete more accurate CO₂ emission estimations. The calculation also does not capture avoided emissions resulting from restoration activities; only those from enhanced forest protection. We decided to separate the emissions avoided from restoration activities as preserving forests from deforestation and reforestation both have slightly different climate mitigation effects. In this conversion equation, the number of hectares (ha) of better protected forests is denoted with n . 1 hectare of forest better protected from deforestation (i.e., not being turned into cropland) is equivalent to the prevention of 254 tons of carbon per hectare being decomposed or burned. To convert the carbon stock into CO₂, the estimate was multiplied by a factor 3.7. This conversion was taken from a study of undisturbed forests in Sumatra (Murdiyarso et al., 2002) and recommended for use by CIFOR scientists as the most appropriate method for generalizing emissions.¹⁶ Therefore, there is much nuance in reporting potential CO₂ emissions levels which may be over- or under-estimated depending on land-type and geography. Although not accurate, we deemed it important to calculate and present approximate figures for CO₂ emissions avoided as a key focus and outcome of FTA's work, particularly regarding contributions to climate change.

As evident from the above lists, the low-end estimates focus on more immediate outcomes and impacts that already may have been fully or partially realized. Some low-end estimates may not have been realized yet as some projects are still in progress and/or additional time is needed for full realization. However, the sound logic of the ToCs suggest that these low-end impact estimates that have yet to be realized have a greater likelihood of doing so. The high-end estimates focus on longer-term potential outcomes and impacts that have not yet been (or may never be) realized. Many of the high-end estimates are based on optimistic (and sometimes unrealistic) assumptions about the uptake, use, and scaling of FTA's outputs and the perfect implementation of policies. Moreover, the long lag times inherent to forests, trees, and agroforestry, as well as to some of the impact pathways within Challenge 1, make the high-end estimates highly uncertain.

Note that some projects reported both low- and high-end impact data while some reported neither. The low-end estimates and high-end potential do not represent all FTA interventions, but only interventions where impact estimates using the identified metrics were available, or quantification was possible. In some countries, there is potential for double counting of or overlap in area that is governed by multiple policies. For example, REDD+ global and Wetlands clusters both contributed to the PIPPIB in Indonesia. We have tried to account for this where possible (e.g., by separating land types targeted), but have flagged potential overlapping policies which need closer review.

All challenges shared a set of general conditions and caveats that underpin the preliminary impact estimates. More detailed and challenge-specific conditions for each impact estimate are documented in Appendix 3. We relied on the presumption that the evidence sources consulted in the review contain accurate, reasonable, credibly-derived, and reliable impact estimates. We continuously interrogated the estimates and their corresponding supporting evidence to ensure FTA made plausible contributions to the reported potential impacts. Within the ToC sphere of control, we assumed that FTA is perceived as a credible and trusted partner and can exert influence on policy and practice change as a result. In addition, we assumed that FTA's training and capacity-building efforts stimulated learning and built skills that are applied and scaled. Within the sphere of influence, to count the area targeted or governed by policies and monitoring systems influenced by FTA, we assumed that these mechanisms are or will be properly implemented and enforced. We assumed that target groups of these mechanisms were and continue to be incentivized to comply with regulations and change practices to receive benefits (e.g., tenure, PFES). We also assumed that boundary partners continue to support capacity-building and scaling of appropriate management

¹⁶ The conversion factor is based on the ratio of molecular weight of CO₂/C = 44/12 = 3.66666

practices post-project and post-FTA. Within the sphere of interest, we assumed that FTA's contributions to policy and practice change are significant enough to bear impacts, and that external factors and processes do not interfere with or reverse FTA-influenced policy or practice change. Moreover, we assumed that potential impacts can eventually be realized as successful policy mechanisms, monitoring systems, and management practices are scaled.

3.1 Limitations

Access to further qualitative data proved challenging overall owing to internal resource constraints and external factors out of the control of the evaluation team. For example, the team planned to collect additional data in the field (e.g., to support the Vietnam deep dive), but was unable to collect further information due to research activity restrictions put in place by the government and the COVID-19 pandemic. The deep dive analyses had low response rates as a result. Relying on FTA scientists to identify potential informants to test outcomes and impacts can introduce bias into data collection as informants may be identified by key scientists for their likelihood to reflect positively on FTA project results. Therefore, to address these limitations, findings were triangulated with evidence within project documents as well as external evidence (e.g., webinars, government documents) to ensure the reliability and credibility of data and cross-check information received. Requesting interviewees to discuss events (e.g., research activities and potential outcomes) that happened some time ago often rely on recall of project details, which can be difficult for some informants, highlighting further the importance of data triangulation and continuous monitoring and evaluation reporting. There were also limitations with the data available and some clusters did not present evidence of expected or potential impact figures, and the methodologies used for some of the figures presented were unclear (see Table 2 for the discussion of document reliability assessment). Moreover, there were difficulties in separating outcomes and impacts between clusters where FTA's work on reducing deforestation and forest degradation was closely aligned and overlapped in terms of project topics, geography, actors engaged, and intended outcomes, as well as with the confluence of external dialogues and fora on inter-related issues and initiatives. For example, there is a cross-over with outcomes and impacts between the Wetlands and REDD+ clusters which may have resulted in double-counting of impact estimates. There were also challenges in identifying and separating available impact data between Challenge 1 and Challenge 2 (which is focused on restoration), as all Challenges addressed by FTA are fundamentally interlinked. Lastly, using a standard formula to present potential impact regarding avoided CO₂ emissions does not capture the differences in land-types and varying amounts of CO₂ stored within them and released when deforested. For example, we assume that if 1 ha of forest is saved from deforestation, it is equivalent to the prevention of 254 tons of C/ha being decomposed or burned (to convert the carbon stock into CO₂-equivalent, multiply by a factor of 3.7). This equation is used as a proxy to convert low and high-end estimates of better protected forest areas into estimates of CO₂ emissions avoided. Its application assumes that the majority of the forest areas are of the undisturbed tropical forest type. It is acknowledged that different ecosystems release different amounts of carbon when being fully deforested. For example, undisturbed tropical forests in Indonesia store more carbon (254 tonsC/ha; the reference used here) compared to forests used by local communities for producing non-timber commodities (176 tons/ha) (see Murdiyarso et al. (2002), p.435, table 4 in connection with p.432, table 1). The equation was applied for all clusters considering time and resource constraint, as it was difficult, and, in some cases impossible to identify the specific land-types prevented from deforestation across the clusters. The evaluators hence recognize the emission impact estimates contain a considerable margin of error.

4 Challenge 1 Theory of Change

Addressing deforestation and the degradation of forests constitute an important focal area of scientific and applied research for FTA. Deforestation is a global challenge negatively affecting biodiversity, ecosystems, and the climate and in some cases, access to sustainable livelihoods for communities. Challenge 1 is therefore closely interconnected with FTA's other four challenges. On average, the FAO's Global Forest Resources Assessment estimates that 10 million hectares of forest were cut down each year between 2015– 2020 (FRA, 2020). Over 2015–2017, the average global loss of tropical forests contributed approximately 4.8 Gt of carbon dioxide per year (Global Forest Watch, 2021). Global deforestation is driven by direct (i.e., human activities), as well as indirect or underlying drivers (i.e., complex social, economic, political, cultural, and technological interactions) at multiple scales (Kissinger et al., 2012). Poor forest management and lack of transparency in land use have been key drivers of deforestation. Under COP26 (2021), 141 nations signed the Declaration on Forests and Land Use and pledged to halt and reverse deforestation and land degradation by 2030 across 3.7 billion hectares of forests worldwide, paving the way for future research investment.

As a result, FTA works globally, supporting research across Asia, Africa, and Latin America. FTA's research addresses the following drivers of deforestation/forest degradation:

1. Poor forest management, transparency of information, and governance;
2. Illegal logging;
3. Anthropogenic burning and natural forest fires;
4. Agricultural expansion in forested areas (in many cases overlapping instances of burning)

FTA research addresses the following effects of deforestation/forest degradation:

1. Resulting carbon emissions exacerbating the effects of climate change;
2. Resulting haze and health impacts from anthropogenic forest fires;
3. Resulting livelihood impacts from forest resource scarcity

FTA addresses these inter-related aspects of deforestation and forest degradation by providing knowledge that frames issues, generating data on forests to understand current conditions and trends over time, developing policy solutions and innovations, offering guidance and support for implementation, and/or social process contributions via capacity-building and targeted engagement to:

1. Improve governance and management of natural forest resources by informing and supporting the development of legal frameworks (FLEGT, fire prevention, regulations for specific agricultural commodities, agroforestry concessions) that provide incentives to change practices in order to reduce deforestation and forest degradation;
2. Improve mechanisms for climate mitigation (REDD+, wetlands, agroforestry) to align mechanisms for reducing deforestation with the climate change agenda;
3. Garner support from development NGOs and other organizations with similarly aligned objectives;
4. Improve private sector and community practices to reduce deforestation and forest degradation

There are multiple pathways to these goals, which involve the engagement of multiple actor groups and multiple processes. FTA's research and engagement aim to influence the following actors/action arenas (Figure 1):

1. Researchers advancing issues on the topics of deforestation and forest degradation to improve the knowledge base and advance research agendas (via collective academic efforts, publishing, engaging in academic debates, engaging research funders);
2. Government policymakers developing and revising national and sub-national policies (via improving technical capacity, data access, framing issues to garner attention for action) and government agencies tasked with policy implementation;
3. NGOs', (boundary) partners', and allies' advocacy to push for mechanisms and ways to reduce deforestation and forest degradation (via framing issues and improving access to quality data), this applies to both policy and practice;

4. The public, better informed through networks and the media, hold governments and large corporations accountable for more sustainable policies and practices, and change their own consumption patterns.
5. Corporate-scale private sector (i.e., large-scale companies) changes its practices, including:
 - a. Supply chain transparency and management
 - b. Compliance with regulations and adherence to principles of zero deforestation commitments and corresponding certification schemes
 - c. Better agricultural practice that does not contribute to forest loss and degradation
6. Small-scale private sector (i.e., smallholders and SMEs) changes its practices, including:
 - a. Formalization;
 - b. Awareness-building for available policy mechanisms and certification schemes;
 - c. Eligibility identification and compliance capacity development with available policy mechanisms and certification schemes;
 - d. Piloting and long-term compliance support with available policy mechanisms and certification schemes

Through the realization of the above outcomes, it is expected that FTA's research will contribute to reduced deforestation and forest degradation through:

- Enhanced forest protection through the establishment of better regulated conservation areas and more sustainable forest management (in Congo Basin, Indonesia, Peru, Mozambique, DRC, and Guatemala)
- Improved forest monitoring systems (e.g., FLEGT/VPA) and market function to reduce instances of illegal logging globally, with a particular focus in Central and West Africa (e.g., Cameroon, Ghana, Gabon, Ghana, Liberia, Sierra Leone, Tanzania, Cote d'Ivoire, Zambia, and DRC)
- The effective implementation of REDD+ policies and practices to reduce deforestation-driven climate change (globally, with a particular focus in Indonesia, Vietnam, Brazil, Peru, Tanzania, DRC, Cameroon, and Ethiopia)
- Reduced instances of forest fires (in Indonesia)
- Reduced agricultural expansion into natural forests for cash crop production (in Indonesia and Peru)

Key assumptions underpinning FTA's contributions to reduced deforestation:

- FTA holds a significantly credible position in the academic realm in research for/in development, and is therefore able to exert influence over the way research agendas advance
- The policies to which the research has contributed are effectively implemented and enforced to reach intended targets for reductions in deforestation (i.e., policy changes are sufficient to influence practice and reduce deforestation)
- NGOs, partners, and organizations with sustainability objectives are actively seeking out evidence to support their campaigns and programs to continue to work with policymakers, communities, and the private sector in efforts to reduce deforestation and reverse forest degradation
- The public is aware and informed of possible ways to reduce deforestation and forest degradation and is actively campaigning for change at policy, practice and individual levels
- Large companies uphold commitments to zero deforestation as a result of policy and market pressures
- As smallholders and SMEs gain access to formal markets and tenure via enabling policies that reduce barriers, these groups are better equipped to comply with sustainability requirements
- All actor groups that receive training from FTA interventions benefit and obtain new knowledge, skills, and relationships as a result, and are both motivated and capable of leveraging their knowledge and relationships and applying their skills in their work.

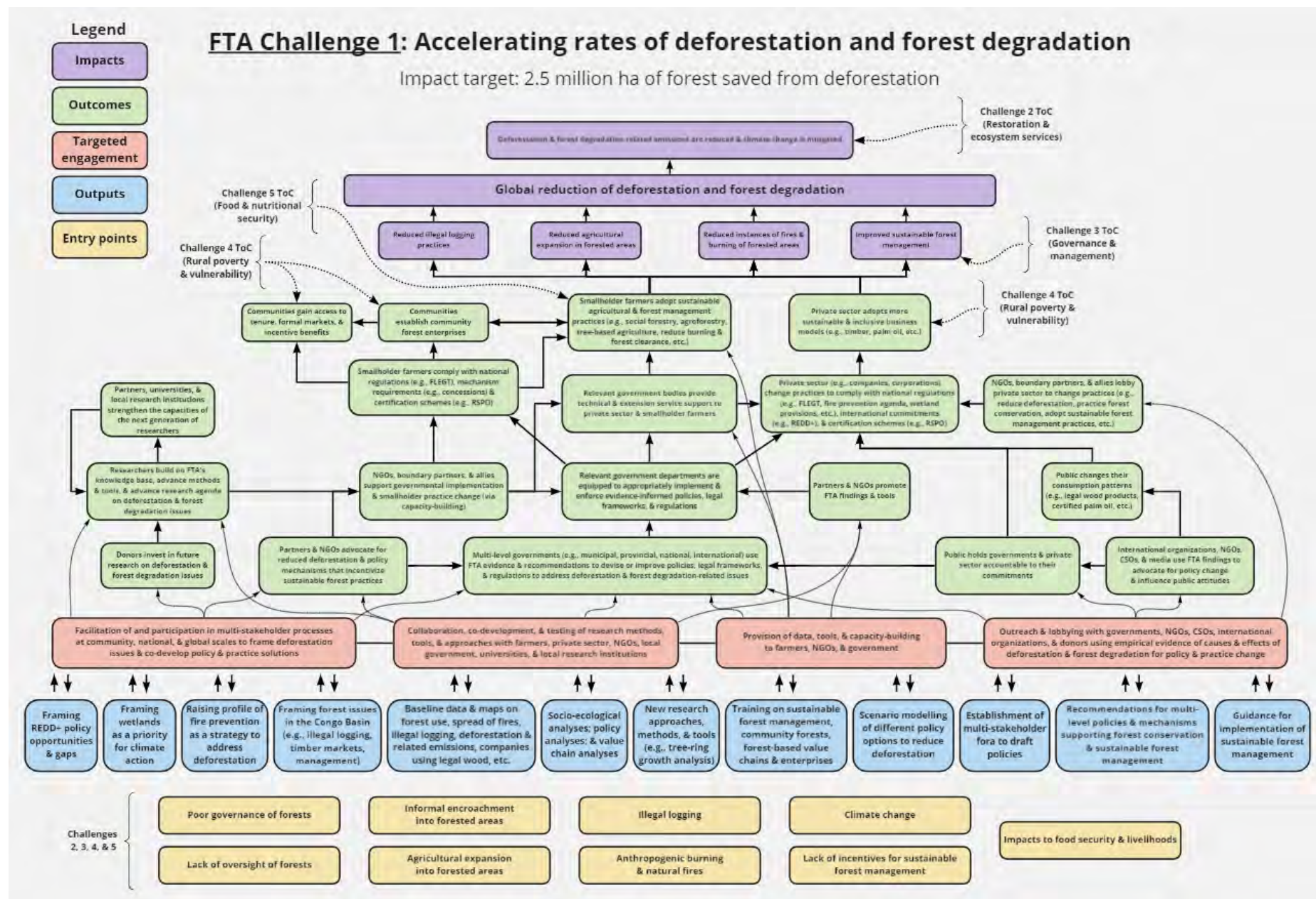


Figure 1: Overarching ToC outlining FTA contributions to Challenge 1 (Deforestation and Forest Degradation)

5 Results

5.1 Outcome Assessment

The results presented in this report answer the guiding research question for the FTA Integrative Studies: *To what extent and how did FTA's research portfolio realize outcomes in each of the five Challenges?* In this section, we summarize the extent to which there is reliable evidence that outcomes and potential impacts in addressing the overarching Challenge 1 ToC (Figure 1) and the respective cluster-level sub-ToCs (see Figures 3-13 in Appendix 1) were realized. The results focus on impact narratives of each of the clusters using available evidence, main contributions to outcomes (Table 2), and deep dive analysis of one cluster (REDD+) under Challenge 1. The assessments are based on available evaluation evidence (i.e., theory-based outcome evaluation reports, outcome stories, final reports, annual reports, interviews with key scientists, etc.).

5.1.1 REDD+ Cluster Results

In addition to international and national climate change policy mechanisms, reliable data are needed to support effective policy mechanism implementation to address the negative effects of deforestation- and degradation-driven climate change. Since 2009, FTA's Global Comparative Study (GCS) on REDD+ aimed to influence policy at sub-national, national, and international levels. By establishing research partnerships with key stakeholders working in climate change and maintaining their active participation in multi-stakeholder platforms to facilitate the dissemination of knowledge outputs, FTA research informed policymakers, governments, and REDD+ practitioners at national and sub-national levels on policy options and guided them on the opportunity and implementation of such changes. FTA research also contributed to an improved understanding of the drivers of deforestation in countries such as Cameroon, Indonesia, Peru, and Vietnam. In recognition of the utility and applicability of FTA's recommendations, policymakers have taken up and used policy guidelines put forward by FTA to enhance forest management. FTA research on REDD+ supported the increased efficiency and effectiveness of national REDD+ policies in several countries with national policymakers promoting FTA research. FTA's contributions to outcomes and impacts via global and national REDD+ policies are described in further detail below.

Global: FTA's expertise contributed to a UNFCCC decision in 2011, recommending a stepwise approach on setting, measuring, and reporting forest reference emission levels (FREL) (UNFCCC Decision 12/CP.17) (Young & Bird, 2015). The stepwise approach has become the main method used to guide countries to improve capacity to carry out REDD+ programs, mainly in setting their FRELs. Adoption of the stepwise approach gave countries with differing capacities the opportunity to engage with the international REDD+ process. This achievement created a bridge between countries aiming to protect forests and the international REDD+ process, facilitating the production of data on emissions and also the potential for payments. In 2015, UN-REDD made tenure part of its strategy framework based on information FTA generated in GCS REDD+. Land tenure is a major determinant of equity of REDD+ schemes. The credibility of FTA's research contributed to convincing the UN-REDD Policy Board of the scientific merits of integrating tenure, which encouraged decision-makers to give land tenure a higher priority in their programs.

Brazil: FTA supported the creation of a municipal commission and implementation of a pact to reduce deforestation (Green Municipalities Program). The Government of the state of Pará drew on GCS REDD+ research findings to develop its jurisdictional REDD+ strategy in 2020.

Cameroon: FTA research outputs contributed to the Cameroon Readiness Preparation Proposal (RPP) through incorporation of key achievements as determined in ODI's assessment (Young & Bird, 2015), including the incorporation of FTA's recommendations on REDD+ policy at the national and international levels. The RPP has the high-end potential to cover 1.8 million ha of land where deforestation rates could be reduced. The Government of Cameroon has also expressed high interest in scaling up the use of the LUWES tool (Land-Use Planning for Low Emission Developing Strategies). The Ministry of Environment, Nature Protection and Sustainable Development (MINEPDEP) officially requested FTA support for LUWES training in view of the Cameroon REDD+ strategy and the national MRV. On invitation by the MINEPDEP minister, FTA is among the leading

institutions in developing the harmonized cover legend for REDD+ Measurement, Reporting, and Verification (MRV) in Cameroon which has now become a nationally approved priority as a way forward to improve the performance of REDD+ MRV as outlined in the UN-REDD National Forest Monitoring systems.

Colombia: FTA's contribution to low-emission development strategies in Colombia provided key inputs for the development of Colombia's Intended Nationally Determined Contributions (INDC) to climate change mitigation under the Paris Agreement and the Forestry NAMA. It contributes directly to the improvement of synergies and trade-offs between ecosystem services, such as water resources and resilience under the Convention of Biological Diversity (CBD), to support ecosystems resilience to climate change impacts to consequently contribute to reducing deforestation and greenhouse gas (GHG) emissions.

Ethiopia: FTA engagement with government technical staff in Ethiopia resulted in the country adopting FTA's stepwise approach to MRV of GHG mitigation measures, and continuously improving and adapting the forest and natural resource monitoring capacities. The stepwise approach played a crucial role in advancing Ethiopia's position in the international REDD+ negotiations. Research co-produced by FTA and Ethiopian research partners increased institutional and technical capacity of practitioners. FTA provided information relevant to the development of the national REDD+ strategy and the benefit sharing mechanism of the Oromia Forested Landscape Program. There are indications of uptake of FTA research on exclusion, benefit sharing, and gender in forestry by technical experts for the development and implementation of Ethiopia's Climate Resilient Green Growth.

Guyana: FTA workshops in Guyana helped national authorities to develop their own MRV system. FTA engagement with government technical staff in Guyana resulted in the country adopting FTA's step-wise approach to MRV of GHG mitigation measures, and continuously improving and adapting the forest and natural resource monitoring capacities. FTA also supported the Forestry Commission's training on direct forest monitoring, forest area assessment, biomass estimation, and carbon measurement using new technologies and methods. FTA continues to support the Guyana Forestry Commission's monitoring of GHG due to deforestation and forest degradation.

Indonesia: FTA research contributed directly to high-level policy dialogue on REDD+, increasing the capacity and influencing the behavior of national policymakers and other actors to promote effective, efficient and equitable (3E) REDD+ approaches, supporting the country to become "REDD+ Ready" (Young and Bird, 2015). FTA contributed to the development of the Indonesian National REDD+ Strategy and supported the improvement of Indonesia's FREL through refined GHG accounting in wetlands, including the national MRV system for emissions. FTA also directly supported the establishment of the Indonesia National Carbon Accounting System (INCAS) in 2015 using FTA data. With financial support from Australian Aid, FTA worked to support the technical services of the Forestry and Environmental Research Development and Innovation Agency (FOERDIA) in the Ministry of Environment and Forestry (KHLK) to assess deforestation using different datasets. By contributing to the design of Indonesian REDD+ policies, establishing good relationships with the Government of Indonesia (GoI) (both personally and institutionally), and promoting and sharing FTA research, data, and recommendations, FTA supported extensive policy change. As a result, national policymakers viewed FTA outputs as a main source of spatial and contextual information to inform REDD+ in Indonesia leading to GHG reduction through 3E policy that enforces reduced deforestation and generates co-benefits. Although the rate of deforestation has significantly decreased (Scholte, 2019), Indonesia still suffers from illegal activities, signaling the threat of continued deforestation and underlying drivers that demand stricter law enforcement (Tacconi et al., 2019).

Box 1: REDD+ in Indonesia, a deep dive

Primary forest loss in Indonesia reached levels of almost 684,000 ha in 2009 (Global Forest Watch, 2021). Identifying the need to cut back on deforestation and peatland exploitation activities, the Government of Indonesia (GoI) and the Government of the Kingdom of Norway (GoN) entered a REDD+ partnership agreement through a Letter of Intent (LoI) signed in 2010 (prior to the start of FTA) to reduce GHG emissions from deforestation and forest degradation by 26% by 2020 through a series of results-based payments (RBP). FTA research aimed to support policy processes outlined in the LoI by acting as a “trusted partner” and providing objective knowledge in the form of evidence-based research findings, tools, and guidance on GHG emission reduction options through the GCS REDD+ program.

FTA indirectly contributed to the alternative formalization of the PIPPIB¹⁷)...

Following the signing of the LoI, FTA played a convening role to gather important actors (e.g., Norway’s International Climate and Forest Initiative (NICFI) and Indonesian Civil Society) to discuss issues laid out in the agreement. Included in the LoI was the suspension on the issuance of new concession permits (e.g., the PIPPIB) (LoI, 2010). Evidence suggests that the PIPPIB can be traced back to the indirect influence of FTA scientists as one of the many contributors who produced timely research and developed frameworks which subsequently guided the direction of the policy and the decision to include peat forests in conservation efforts (Flores, 2016). Studies from FTA, as well as other scientific institutions (e.g., FOERDIA), highlighted the need to protect primary forests and peatlands in Indonesia to meet GHG targets and prevent deforestation and forest degradation, (Gov2; Young & Bird, 2015). However, some informants suggested that civil society advocacy groups had advocated for a suspension on new permits for decades prior to PIPPIB implementation (Gov1).

... and completed an impact evaluation of the initial policy (Murdiyarso et al., 2011) by presenting data on where it could be improved...

FTA also released data on peatlands and wetlands (Murdiyarso et al., 2011), drew attention to the need to include logged-over and secondary forests in the PIPPIB, and identified discrepancies in the definition of peatlands stated within the policy which were affecting the policies potential impact to meet GHG emissions reductions targets through reduced deforestation and forest degradation. Logged-over and secondary forests amounting to 12.7 million ha have not been included in the PIPPIB policy, but are instead used within the TORA (Tanah Objek Reformasi Agraria) program focused on providing sufficient land for agricultural development. These gaps highlighted by FTA revealed weaknesses in governance, the need to improve PIPPIB maps to monitor deforestation levels, and the importance of the protection of peatlands and mangroves which have supported the fine-tuning of the PIPPIB policy (Gov1; Gov2).

... to support the PIPPIB in contributing to practice change among private sector actors...

In this respect, FTA’s research, along with other efforts from institutions such as IPB, supported the GoI in highlighting policy gaps and identifying where efforts could be concentrated (Gov1). The PIPPIB has now become law and covers many weaknesses in governance to ensure the concessions system is transparent (Gov1). As a result of the PIPPIB, as well as external pressures such as global markets, some large-scale plantation companies in Indonesia have committed to zero-deforestation and have stopped converting natural forests to plantations (PS1). The PIPPIB provided large-scale plantation companies with the opportunity to expand productivity and yields, increase the quality of plantation, and focus on reducing emissions from deforestation (PS1). However, to reduce deforestation through this policy, plantation companies must not take advantage of loopholes within the PIPPIB.

... hence contributing to the decline of illegal logging practices by the business sector...

The PIPPIB is a powerful policy that is actionable and invites the private sector to participate in reducing deforestation-related activities (Res2; The State of Indonesia’s Forests Report, 2020). The PIPPIB clearly dictates that forest encroachment is no longer deemed acceptable and Indonesia’s deforestation actions are being watched by the world. The PIPPIB covers approximately 66 million ha of primary forests and peatlands. New concession licenses may no longer be awarded within these areas, with exceptions for licenses that were in the process of being awarded when the PIPPIB was initially declared (The State of Indonesia’s Forests Report, 2020). If the PIPPIB targets are realized and the GoI does not change the land area protected (e.g., does not make exceptions for the food estate program), 66 million ha may be better protected from deforestation and forest degradation (high-end impact potential). However, the PIPPIB only provides

¹⁷ In 2019, the Forest Concession Moratorium (FCM) was renamed Peta Indikatif Penundaan Pemberian Ijin Baru (PIPPIB), or Indicative Map Postponement of Granting of New Licenses

additional coverage to 22.5 million ha of primary forests and peatlands not covered under existing concession schemes (comprising 7.2 million ha of primary forests, 11.2 million ha of peatlands, and 4.1 million ha that fall into neither of these categories) (Murdiyarso et al., 2011). The remaining 5.8 million ha of peatlands (29% of Indonesia's total peatlands) is not covered by the policy.

... and ultimately to better protect primary forests and a decrease in deforestation in Indonesia.

Following implementation of REDD+ policies, the Indonesian deforestation rate fell by 75% to its lowest level in 2020 since monitoring began in 1990 according to the KHLK (Mongabay, 2021). The third-party review implemented by Norway also found that the annual rate of deforestation (ha/year) fell from 913,820 in 2006-2009 to 673,838 in 2016-2017 (Aenor, 2020). Officials attribute these declining deforestation figures mainly to government policies on land and forest rehabilitation, the PIPPIB and effective enforcement of the policy, and a moratorium on issuing licenses for new oil palm plantations on state forest area (Mongabay, 2021; Res2; Jakarta Post Webinar, 2021). The PIPPIB is also noted to have resulted in a number of regulations, initiatives, and programs being issued at the subnational level to comply with new regulations aimed at environmental and landscape sustainability. On July 3, 2020, the GoN officially announced the first RBP to Indonesia for reduced emissions from deforestation and degradation in the country for 2016-2017 compared to those in the preceding decade.

Counterfactual

It was suggested that specific features of the PIPPIB would not have been different in the absence of FTA research on REDD+ (Gov1; Gov2); however, in the implementation of the LoI, FTA was a key actor, making a credible and legitimate effort as a convening power and independent body of knowledge (Gov1). FTA, through CIFOR scientist's close relationships with government actors, helped to create an understanding in the REDD+ partnership between the Norwegian and Indonesian governments, which neither government could have done alone (Gov1). Without implementation of the PIPPIB, informants predicted that deforestation levels would be much higher than they currently are (PS1; Gov1). Absence of the PIPPIB may also have had adverse effects on perceptions of the Indonesian forestry sector within the global market, as demand for environmentally sustainable and responsible products affects exports and trade (PS1; Gov2). However, impact has resulted from the combined efforts of many interventions, including improved law enforcement and cannot be solely attributed to the indirect contributions of FTA's research on REDD+ (Gov2). On September 10, 2021, the GoI decided to terminate the LoI with the GoN "based on the lack of concrete progress on the implementation of the obligation of the GoN to deliver the RBP" (Ministry of Foreign Affairs, Indonesia, 2021). The GoI stated that decision to terminate the LoI will not affect the GoI's commitment to reduce GHG emissions. Assessment of assumptions can be found in Appendix 2.

Peru: FTA's research and engagement contributed to the Peruvian National Strategy on Forest and Climate Change and stimulated the initiation of a national cross-sectorial process for the legal recognition of peatlands. FTA's expertise on peatlands and deep engagement in Peru led to the initiation of a process for the legal recognition of peatlands in the country. FTA contributed 18 pages of comments and recommendations to the National Strategy for Forests and Climate Change, which were publicly endorsed and referenced FTA's research on mitigation-adaptation synergies. The Strategy identifies the major threats to Peru's forests (threatening 78.3 million ha) and lays out a strategy for countering them. FTA also contributed to the development of the INDC in Peru as part of the country's commitment to conserve the national forest to avoid GHG emissions and reduce deforestation. In recognition of FTA's prior expertise and perception as a credible source of information on REDD+, the Ministry of Environment (MINAM) requested FTA's assistance to help identify and enhance strategies towards REDD+ benefit sharing. As a result of this engagement, MINAM developed a conceptual framework on benefit sharing to contribute to the national commitment to conserve 54 million ha of tropical forests through climate change mitigation and sustainable development. FTA's reflexive learning tool for multi-stakeholder fora is being adapted with Peru's National Service of Natural Protected Areas (SERNAP) for use with its 75 co-management committees. Following recommendations from the studies conducted by GCS REDD+ on peatlands, the recent Law of Multisectoral and Decentralized Management of Wetlands (November 2020) included Amazonian peatlands (*aguajales*). This reveals the close link between GCS REDD+ Module 3 knowledge sharing activities on peatlands in Peru and the technical research on peatlands, and GHG dynamics in undisturbed and degraded palm dominated swamp forests. This led to the acknowledgement by the Government of Peru (GoP) of the need to formally recognize and protect its peatlands, thus contributing to policy change.

Vietnam: There are indications that FTA's research and active engagement with government and non-state actors in Vietnam contributed to an effective, efficient, and equitable implementation of a Payment for Environmental Services (PFES) policy through knowledge creation, capacity-building (for implementation and for research), coalition-building, and additional research in the sector. FTA's award-winning research¹⁸ has been instrumental in supporting the development of national PFES policy, which was approved by the government and is being adopted by provinces across the country. Through engagement with key stakeholders, including local policy decision-makers, FTA tailored its research to the government's concerns. Overall, FTA's new knowledge and tools have informed the implementation of the National REDD+ Program and specifically engaged policymakers at national and subnational levels (e.g., Provincial People's Committee, Provincial REDD+ Fund) to ensure that lessons learned at the subnational level inform national policy dialogues to reduce deforestation.

Box 2: REDD+ in Vietnam, a deep dive¹⁹

In 2008, Vietnam launched Asia's first PFES policy following decades of deforestation and forest degradation. PFES aims to improve local livelihoods, enhance forest protection and development, and reduce state investment in the forestry sector (Pham et al., 2018). In the past, the Vietnam forestry sector operated mainly through a state budget allocation mechanism which was unstable and vulnerable. As a result, the government of Vietnam aims to develop a forestry sector that is funded by a variety of sources (e.g., State, non-state actors, national and international schools etc.) and PFES, with funding from public and private sector, presents the opportunity for a diversified contribution and potential increased responsibility for forestry sector development. PFES was implemented country-wide in 2010 and is one of the ten greatest successes of the forestry sector in Vietnam over the course of 2010-2020, contributing to 25% of total investments in the forestry sector (Nguyen et al., 2020; Pham et al., 2020).

FTA provided support at the provincial and national level through the GCS REDD+ program...

FTA assessed PFES implementation in delivering effective, efficient, and equitable outcomes. FTA research identified the lack of monitoring and evaluation (M&E) within the PFES system and identified gaps in effective implementation (Pham et al., 2013).

... to improve PFES implementation and M&E modalities, and influence the new Forest Law...

By collaborating with key actors (e.g., Vietnam Forest Protection and Development Fund (VNFF), Ministry of Agriculture and Rural Development (MARD), Winrock International), FTA supported in the development and piloting of a M&E system and a national guideline for PFES financial management. By enhancing M&E within PFES, FTA aimed to improve the effectiveness of the national PFES program by improving the accuracy of payments, and subsequently increasing Vietnam's forest cover, area, and quality, and minimizing deforestation related activities. FTA also provided information, analyses, and inputs to the new Forest Law (2017) to strengthen the legal framework for PFES by increasing payment levels, adding articles on penalties for administrative violations against regulations on forest management, and emphasizing the need to improve M&E. Prior to the Forest Law, there were no detailed guidelines for the implementation of PFES (Gov3).

... build the M&E and data analysis capacity of PFES staff...

FTA researchers provided on-the-job training to provincial PFES staff to learn how to apply the M&E system and supported the application of a rigorous impact assessment and data analysis in monitoring PFES. Before the M&E system, PFES staff did not have the capacities to analyze PFES data (e.g., comparing before and after PFES, in PFES vs. non PFES sites). Following FTA's engagement, Forest Protection and Development Fund (FPDF) staff had increased skills and subsequently used the data analysis methods taught by FTA within their daily work (Gov3). Moreover, staff now have a better understanding of areas of the province with high deforestation rates, forest loss, and where local complaints are reported, enabling the government to make interventions to address poor PFES implementation (e.g., strengthen law enforcement, increase sudden and regular inspection) in a timely manner. This has reduced deforestation rates and enhanced local trust to participate in PFES. Nationally, VNFF used FTA findings to inform revisions to PFES and develop

¹⁸ In 2016, CIFOR received an award from the government of Vietnam for its outstanding contribution to the forestry sector, notably for its work on PFES.

¹⁹ Further details on this case study are provided in a Story of Change infobrief, an assessment report prepared by CIFOR's MELIA team and published in May 2021, accessible via <https://www.cifor.org/knowledge/publication/8028/>.

a new REDD+ policy. FTA research equipped key actors (e.g., Son La FPDF, Winrock International, Cat Tien National Park, Center for Rural Development) with the necessary knowledge and tools to monitor and implement PFES, building on lessons learned from FTA's research and through adoption of the M&E system.

... leading to key policy recommendations...

FTA's work on the topic was the first independent third-party review to assess the impact of PFES, using non-PFES sites as a control (Gov4). FTA research revealed the positive impacts of PFES policy in forest protection of communities, and M&E indicators helped to compare before and after PFES implementation, providing data that was not available prior to FTA's work (Gov5; Gov6; Gov4). This highlighted the need for improvements within the policy and supported other governmental agencies to establish a better understanding of policy impact (Gov4). The before and after data comparison also informed provinces in the development of their M&E protocol and inspection plans to increase accuracy of PFES payments (Gov3).

... an increase in forest protection activities...

After PFES, many villages and communes who in the past refused PFES, now express interest to engage and protect forests through the mechanism (Gov4). Previously, forest rangers experienced many difficulties as local people would enter forests to illegally clear timber for their daily incomes. FTA's research demonstrated that local people have begun to change their actions as a result of PFES and the M&E system because of stronger incentives and strengthened law enforcement that has influenced bottom-up forest protection and minimized deforestation-related activities (Gov4). Forest owners are also noted to have carried out increased anti-trespass activities and established forest protection groups to minimize illegal deforestation (Gov6). These changes assume that PFES payments are high enough to change people's behaviour. Governmental attitudes are more supportive of M&E, as they recognize such activities can support forest protection management and, help improve government administration over forest resources (Gov7; Gov6). Overall, PFES revenue is now perceived as a sustainable source of income within the forestry sector and has increased the awareness, consciousness, responsibility, and action of local people and authorities to protect forests and minimize deforestation (Gov6). For companies and state agencies receiving payment, PFES funds have helped them to protect the forest better (e.g., wages for forest rangers) (Gov7).

... a willingness to carry out more independent verification and use of tools...

Prior to FTA's work, most M&E activities were only carried out by government agencies and were therefore not independent. Following implementation of the M&E system, government agencies encouraged independent M&E, subsequently reducing bias, highlighting opportunities for improvement, and increasing understanding of impact by increasing non-state stakeholders' participation (Gov5). Provinces are also now using the national guidelines/manuals developed in collaboration with FTA to identify what is most appropriate for each province (Gov4). Provinces now exchange knowledge and support each other to design and implement PFES M&E by sharing lessons learned (Gov3). Perhaps the greatest achievement of FTA's work was in normalizing the concept of M&E. As a result, central and provincial governments became more aware of the need for methods to carry out rigorous PFES impact assessments at the community level, and now have access to information on the effectiveness of their PFES program for further improvements and adjustments (Gov3).

... that also contribute to increased transparency and equity of payments...

With increased equity and transparency of Vietnam's M&E system for PFES, the government is equipped to ensure payments are made to the right people, and communities have full transparency of fund allocation, better understanding of the system, and have decision-making power in how money is used (Gov3; Gov7). After the introduction of the M&E system, PFES can only be distributed if all villagers undergo a transparent and accountable review process according to a compulsory protocol. This has served to increase trust in the PFES system (Gov3). PFES have had profound impact on community-level awareness, with increased solidarity among communities to reduce deforestation-related activities (Gov7).

... enhancing PFES as a whole, supporting forest management practices and ultimately putting a larger forest area under protection from deforestation and forest degradation.

Overall, the PFES system covers 6.7 million ha of forest, accounting for 45% of total forest cover in Vietnam (Ngyuen et al., 2020). With the M&E system providing more accurate payments and transparency in land use, FTA contributed to the enhanced protection of forests covered by the PFES system from deforestation and forest degradation, with potential to monitor 6.7 million ha if the M&E system is taken up by all provinces to ensure that payments are accurate. At the provincial level in Son La, 574,000 ha of forest are under the protection of PFES, with gradual improvement of forest

quality and environmental ecology (Gov6). Son La authorities are more active in providing information, organizing, and operating forest protection, forest development, and forest fire prevention as a result of the M&E system (Gov6). Hence, this has contributed to upgrading the forest cover in Son La from 40% in 2005 to 44.5% in 2019 (Gov6). Deforestation, encroachment on forest land, and illegal exploitation of forest products in Son La decreased drastically in the number of cases and damage (e.g., in 2018 it decreased by 967 cases compared to 2009) (Gov6). In recent years, VNFF witnessed a reduction in the number of violations against the Forest Protection and Development Law (almost halved between 2008 and 2013), and a reduction in the area of degraded forests (in 2013 was less than one quarter the area of degraded forest recorded in 2008) (Nguyen et al., 2020).

Counterfactual

However, the full impact of reduced deforestation through PFES differs between provinces, as provinces have achieved varying levels of success in the implementation of M&E (Gov7). If a M&E system had not been implemented for the PFES program, the program's efficiency, and stakeholder confidence in the effectiveness of PFES would otherwise be much lower (Bennett, 2010; Karsenty et al., 2017). Also, without the M&E system, it would be difficult for the government to know how PFES is being implemented and they would be poorly equipped to assess changes in forest cover (Gov6). Overall, without M&E indicators, it would be difficult to evaluate the efficiency of the policy (Gov6). To achieve potential deforestation impact estimates there is also the need to have suitable sanction schemes (Gov7). Assessment of assumptions can be found in Appendix 2.

With the implementation and enforcement of effective REDD+ policies at global and national levels, FTA collectively contributed to the potential protection of between 12.3 million ha and 114.6 million ha of forests across Indonesia, Vietnam, Cameroon, and Peru through the REDD+ cluster. Potential impact rests on the assumption that policy change occurs because of the availability of knowledge outputs to policy-makers and other stakeholders, and research outputs are relevant, appropriately translated, and adapted to fit the needs of boundary partners. Stakeholders noted that personnel at government agencies can change frequently, particularly when restructuring occurs, which has been a barrier to policy influence. In effect, REDD+ researchers often have to start again when turnover occurs, as time is then needed to re-build collaboration and trust.

Outcomes at scale depend on factors beyond the scope of FTA's work. With current FTA contributions supporting positive changes in policy, forestry practices, and increasing the capacities of key actors (anticipated outcomes in the ToC have been realized), the below impact numbers have the potential to be realized in the future. This is based on the assumptions that policies continue to be fully supported by all key stakeholders (full commitment from all actors) and implemented appropriately (supporting mechanisms are in place for people to comply with regulations, there is effective accountability for non-compliance) within countries. Through its global work on REDD+, FTA positioned itself as a key actor within the topic to address deforestation-driven climate change and should continue to influence the system as a knowledge broker, trusted partner, and capacity-builder to ensure intended outcomes continue to progress as expected.

Key results of the REDD+ cluster identified to date are summarized in Table 3 below.

Table 3: REDD+: Key results to date of outcome realization for potential impact, as well as policy, practice, and knowledge generation impact pathways

Policy Influence	<p>Global:</p> <ul style="list-style-type: none"> FTA recommendations informed international climate negotiations for a global REDD+ agreement, which supported and increased the efficiency and effectiveness of national-level REDD+ policies (e.g., Indonesia, Vietnam, Tanzania, Peru, Brazil, Cameroon) UN-REDD made tenure part of its strategy framework based on FTA research Global: FTA's expertise contributed to a UNFCCC Decision 12/CP.17 (Page 16 paragraph 10) on step-wise approach adoption (Young & Bird, 2015) The Land-Use Planning for Low Emission Developing Strategies (LUWES tool) has been adopted by the government of Indonesia and Peru. In Indonesia, the National Planning Board for Development adopted the tool, and it has been used by 33 provincial governments to plan actions to reduce greenhouse gas emissions through reduced deforestation. It was also adapted as a national standard as part of Indonesia's INDC FTA contributed to 6 chapters across the: <ul style="list-style-type: none"> 2013 Wetlands Supplement to the 2006 IPCC Guidelines for National GHG Inventories 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
-------------------------	--

	<ul style="list-style-type: none"> ○ 2019 Special Report on Climate Change and Land <p>Brazil: Government of the state of Pará developed jurisdictional REDD+ Strategy (2020)</p> <p>Cameroon:</p> <ul style="list-style-type: none"> • Policymakers promoted FTA research at the national and international levels, some of which has been incorporated in the REDD+ RPP <p>Colombia:</p> <ul style="list-style-type: none"> • Contributed to the development of INDC <p>DRC:</p> <ul style="list-style-type: none"> • CIFOR invited by the national REDD+ coordinator to evaluate and support DRC's REDD+ progress and national REDD+ policies <p>Ethiopia:</p> <ul style="list-style-type: none"> • Contributed to the development of the national REDD+ strategy and the benefit-sharing mechanism of the Oromia Forested Landscape Program <p>Guyana:</p> <ul style="list-style-type: none"> • Supported the Forestry Commission's training on direct forest monitoring, forest area assessment, biomass estimation, and carbon measurement using new technologies and methods <p>Indonesia:</p> <ul style="list-style-type: none"> • Provided input to the development of 2011 Forest Moratorium (through Inpres No. 10/2011) • Contributed to the development of the Indonesian National REDD+ Strategy • Provided direct support to the establishment of the Indonesia National Carbon Accounting System (INCAS) <p>Peru:</p> <ul style="list-style-type: none"> • Contributed to the Peruvian National Strategy on Forest and Climate Change and stimulated the initiation of a national cross-sectorial process for legal recognition of peatlands • Contributed to the development of Peru's INDC <p>Vietnam:</p> <ul style="list-style-type: none"> • Informed the development of a national PFES policy, which was approved by the government and is being adopted by all provinces in the country • CIFOR became part of a National Task Force to help develop Vietnam's Forestry Development Strategy (2020–2030) through 2045
Practice Influence	<p>Global:</p> <ul style="list-style-type: none"> • FTA expertise contributed to a UNFCCC decision in 2011 recommending a stepwise approach on setting, measuring and reporting reference levels • Support in the development of the Green Climate Fund's (GCF) sectoral guidance for ecosystems, land use and forestry and contributed to GCF's Learning-Oriented Real-Time Impact Assessment (LORTA) initiative • FTA provided support to the European Commission on Transparent Monitoring and REDD+ Finance • FTA supported improved monitoring, measurement, reporting, and verification (MMRV) systems in Indonesia, Vietnam, Guyana, Ethiopia, and Peru <p>Brazil:</p> <ul style="list-style-type: none"> • FTA supported the creation of the Green Municipalities Program <p>Cameroon:</p> <ul style="list-style-type: none"> • FTA supported the development of harmonized cover legend for REDD+ MRV <p>Ethiopia:</p> <ul style="list-style-type: none"> • Indications of uptake of FTA research on exclusion, benefit sharing, and gender in forestry by technical experts for the development and implementation of Ethiopia's Climate Resilient Green Growth <p>Guyana and Ethiopia:</p> <ul style="list-style-type: none"> • Indications of uptake of CIFOR's stepwise approach to MRV GHG mitigation <p>Indonesia:</p> <ul style="list-style-type: none"> • FTA supported improvements to the national FREL through refined GHG accounting in wetlands <p>Peru:</p> <ul style="list-style-type: none"> • FTA's reflexive learning tool for multi-stakeholder fora is being adapted with the National Service of Natural Protected Areas (SERNANP) for use with its 75 co-management committees
Knowledge Generation Influence	<ul style="list-style-type: none"> • 1183 publications, 4,928,356 downloads, 37,849 citations • Global: FTA played a role in facilitating learning platforms for REDD+ to achieve the 3Es (Effective, Efficient, Equitable) • CIFOR is recognized as a REDD+ expert • CIFOR's profile raised on topic of gender, tenure, and climate change and become trust source for training on the topic

Potential Impact	Hectares of forest under enhanced protection; high-end potential 114.6 million (Peru: 54 million ha) (Indonesia: 52.1 million ha of forest (not including peatlands) area covered under the PIPPIB) (Vietnam: 6.7 million ha, total PFES forest area) (Cameroon: 1.8 million ha) Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area²⁰ 107.7 Gt
	Hectares of forest under enhanced protection; low-end estimate 12.3 million (Indonesia: 11.3 million ha area of forest (not including peatlands) newly and fully covered by PIPPIB) (Vietnam: 1,015,760 ²¹ ha, PFES forest area where FTA conducted research and supported M&E system (Son La, Cat Tien, Dak Lak, and Thua Thien Hue provinces)) Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area: 11.5 Gt
Underlying assumptions	<ul style="list-style-type: none"> • Assumes policy targets are realized • Policy change occurs because of the availability of knowledge outputs to policy makers and other stakeholders • Research outputs are relevant, appropriately translated, and adapted to fit the needs of boundary partners • Knowledge and motivation for change is maintained throughout high government turnover • Policies are fully supported by all key stakeholders and implemented appropriately • Land is not lost to fires or other natural disasters

5.1.2 Wetlands Cluster Results

FTA aims to enhance the effective management of wetlands and peatlands to reduce negative impacts of climate change that occurs from deforestation. Based on ground-breaking research, key scientists (supported by a variety of funding, including the FTA-funded SWAMP project) made a pivotal discovery that wetlands store three to five times more carbon than other tropical forests, mostly in the soil. Research, in part supported by FTA funding, supplied data to quantify the loss and degradation of wetlands and associated emissions. Assuming actors are engaged in, have a key interest, and are willing and able to use FTA's science-based knowledge, wetlands research will become more crucial on the agendas of researchers and policymakers worldwide.

Policy: FTA researchers were actively involved in formal discussions, activities, guidance, and expert meetings on wetland issues to improve awareness by policy makers and donors at the UNFCCC. FTA scientists directly contributed to the UNFCCC Task Force on National Greenhouse Gas Inventories (TFI) to develop specific emission factors for monitoring tropical peat swamp and mangrove forest stocks. Evidence shows that the use of FTA research was facilitated by good and long-standing relationships between the lead researchers and influential institutions that helped deliver research recommendations to policymakers. However, other factors including political pressures, financial consideration, and time constraints influenced the policy process. It was intended that countries involved in the UNFCCC process would be better able to account for the emissions generated from wetland ecosystems and consequently protect these ecosystems from deforestation. FTA also contributed to the UNFCCC strategy for sustainable wetland management. Through FTA's research on wetlands, an International Tropical Peatland Centre (ITPC) was established and hosted on the CIFOR Campus in Bogor supported by the Minister of the KHLK in Indonesia. The ITPC's main objective is to ensure that policymakers, practitioners, and

²⁰ The CO₂ equivalent is estimated by converting the forest area using the formula

$$CO_2[Gt]=((n\ ha \times 254\ tC/ha) \times 3.7)/1,000,000,000$$

For a more detailed discussion, see the methodology chapter (Step 5: impact estimation).

²¹ Source: Data provided by Cat Tien National Park; Forest Protection and Development Fund of Dak Lak province and the 2020 national status forest of Vietnam; Forest Protection and Development Fund of Thua Thien Hue province and Decision 439 on forest status of Thua Thien Hue province in 2020 (<https://snnptnt.thuathienhue.gov.vn/?gd=1&cn=198&tc=22351>).

communities have access to sound, credible and legitimate information, analyses, and all other tools needed to design and implement conservation and sustainable management of tropical peatlands (ITPC, 2021). FTA is also part of the Blue Carbon Initiative, a global program that advances the sustainable management of coastal and marine ecosystems (including mangroves) as a climate change mitigation strategy.

As a result of targeted knowledge dissemination (e.g., multi-stakeholder opportunities facilitated by FTA), global knowledge sharing partners are aware of, use, and share FTA wetlands research. Donors' access to information on wetlands was also improved and contributed to increased capacity to understand and address technical wetland issues. With donors advocating policies on wetlands and allocating more funding to support sustainable wetland management, national and international policymakers developed policies to contribute to the reduced deforestation of wetland ecosystems and more sustainable management. With the research being rooted in a strong evidence base and empirically-informed development strategies of sustainable wetland management policy, FTA research collaboratively influenced global policy processes in getting the wetland agenda taken up by the IPCC. Two FTA scientists contributed to the Wetland Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, which serves as the key global reference for all climate change policymakers and scientists to make decisions on international and national levels. Through knowledge co-development and dissemination, some international policymakers recognized the magnitude of wetlands' contributions to the climate response and developed their technical capacity to use the research outputs (e.g., data) to account for carbon in wetlands, subsequently increasing their focus on the wetlands issue. Overall, FTA research and recommendations on wetlands were used by international policymakers, which supported the development of technical guidance and strategies of sustainable wetland management to reduce deforestation of these ecosystems.

In **Ghana**, FTA recommendations for community-managed sustainable harvesting and monitoring activities were incorporated into a set of activities piloted by the Hen Mpoana community-based mangrove management consultant and a local partner. These activities will leverage FTA resources in the western region of Ghana. Overall, outcomes relating to national policymakers and governments assume that governments are aware of and willing to use credible scientific information on tropical wetlands, including findings generated by FTA. FTA wetland research partners claim that sustainable wetland management would not be as successful without the involvement of local governments to implement policies aligned with sustainable wetland management.

In **Indonesia**, FTA research on wetlands was channeled by FTA scientists who supported the drafting of official documents such as the REDD+ National Strategy and encouraged the inclusion of wetlands and peatlands in the PIPPIB. The PIPPIB solely and newly covers 2.6 million ha of primary peatlands and 8.6 million ha of secondary peatlands. FTA also contributed to strategy development and technical methods for sustainable wetland management policy. Subsequently, there was the uptake of the Wetland Supplement in national FREL reporting to the UNFCCC, and the uptake of FTA methods and tools by the government to understand wetland issues, inform policies, and conduct carbon inventories (e.g., below ground biomass, BRG emissions estimations from drained/burned peatland). A member of technical staff at an Indonesian government research agency reported that collaborating with FTA enabled their institution to conduct below ground biomass calculations using a new sampling technique/design for carbon inventory highlighting the capacities built through FTA research on wetlands. However, success in minimizing deforestation in wetlands depends on the relevance and usefulness of the information provided by FTA, and on the willingness and ability of government technical staff to use FTA research and its recommendations to understand the value of conserving wetlands to reduce GHG emissions.

In **Vietnam**, the SWAMP Toolbox was utilized for a series of trainings with media, journalists, and NGOs to build the capacities of journalists to communicate forest-cover change and to raise the awareness of deforestation among mangrove and peat ecosystems. The SWAMP Toolbox provides basic training materials for academia, policymakers, and practitioners on issues related to climate change adaptation and mitigation strategies to increase understanding around the importance of wetland ecosystems as carbon reservoirs. Through MARD, the government requested support from FTA scientists to carry out research on a future PFES scheme for mangroves. In collaboration with MARD and Vietnam National University, FTA carried out a feasibility study on PFES for

carbon. An infobrief from the study was later used by the Department of Planning and Finance under MARD as baseline data to analyze the PFES pilot on carbon.

Practice: As a result of government and policy pressure, the private sector was expected to comply with new policy provisions and reduce stress on wetlands. There is limited evidence for the realization of this outcome. FTA did contribute to some practice changes at local community and private sector levels in coastal zones where projects operated in terms of climate adaptation and mitigation strategies for adapted private sector approaches for coastal infrastructure and development. Through targeted knowledge dissemination, industries outside of these local communities were expected to become aware of and use credible scientific information on tropical wetlands to support their sustainable management and reduce deforestation. Such large-scale practice changes have not yet been observed.

Knowledge generation: FTA researchers were actively involved in formal discussions, activities, guidance, and expert meetings on wetland issues to improve the awareness of policymakers and donors at the UNFCCC. Since the UNFCCC began to discuss wetland issues in 2008, the number of wetland studies has increased. FTA research has helped to raise academic and policy interest and advance the research agenda in wetlands, mangroves, and peat forests as carbon reservoirs through the variety of highly cited and influential research outputs. FTA also supported the capacity-building of researchers and students to continue work on the topic (e.g., SWAMP provided funding for 8 doctoral students to conduct studies on tropical peatland ecosystems). Some researchers have continued to work on the topic and utilize knowledge obtained through FTA research experiences to inform climate adaptation and mitigation strategies for local community development and integrate sustainable practices by the private sector in building coastal infrastructure and development. As researchers continue to actively promote sustainable wetland policies, highlight the carbon density of tropical wetlands, and develop cost-effective techniques for monitoring them, FTA scientists played a crucial role in increasing consideration of these biomes in climate change mitigation strategies, subsequently influencing the research agenda.

FTA research on wetlands resulted in measurable change on the ground in how wetlands are managed, including the avoidance of GHG emissions through wetland conservation and reducing deforestation globally. With the realization of the above outcomes, it is expected that wetlands and peatlands globally would become sustainably managed and preserved in the interest of addressing the causes and effects of climate change. For example, through FTA's indirect contribution to the PIPPIB in Indonesia, it can be estimated that over 11 million ha of peatlands are under enhanced protection from deforestation (low-end estimate). The above assessment has provided confidence that the ToC is sound, therefore there is reason to expect that higher-level outcomes and impacts may also be realized in the future.

Key results of the Wetlands cluster identified to date are summarized in Table 4 below.

Table 4: Wetlands: Key results to date of outcome realization for potential impact, as well as policy, practice, and knowledge generation impact pathways

Policy Influence	<p>Global:</p> <ul style="list-style-type: none"> FTA contributed to UNFCCC strategy for sustainable wetland management Contribution to the Task Force on National Greenhouse Gas Inventories (TFI) FTA contributed to the Wetland Supplement to the 2006 IPCC Guidelines for National Greenhouse FTA is now a part of the Blue Carbon Initiative <p>Indonesia:</p> <ul style="list-style-type: none"> FTA contributed to strategy development and technical methods for sustainable wetland management policy Uptake of the Wetland Supplement in national FREL reporting to the UNFCCC Uptake of FTA methods and tools by the government to understand wetland issues, inform policies, and conduct carbon inventories (e.g., below ground biomass, BRG emissions estimation from drained/burned peatland) <p>Vietnam:</p> <ul style="list-style-type: none"> Uptake of FTA research on future PFES scheme for mangroves to analyze PFES pilot on carbon by the end of 2020
-------------------------	---

	<ul style="list-style-type: none"> FTA supported the Vietnam government with feasibility studies and infobriefs that are being used by the Department of Planning and Finance under MARD as baseline data to analyze PFES pilot
Practice Influence	<ul style="list-style-type: none"> An International Tropical Peatland Centre (ITPC) was established (hosted on CIFOR Campus in Bogor and officiated by the Minister of Environment and Forestry of Indonesia) <p>Ghana:</p> <ul style="list-style-type: none"> Recommendations for community managed sustainable harvesting and monitoring activities have been incorporated into a set of activities that Hen Mpoana-community-based mangrove management consultant and local partner are piloting <p>Indonesia:</p> <ul style="list-style-type: none"> Uptake of FTA research to inform communities' climate change adaptation and mitigation strategies for community development Indication of integration of SWAMP-informed sustainable practices by the private sector for coastal infrastructure and development <p>Vietnam:</p> <ul style="list-style-type: none"> SWAMP Toolbox and a series of trainings for media, journalists, and NGOs supported awareness-raising and journalists' capacities to communicate simple and accurate messaging on forest-cover change
Knowledge Generation Influence	<ul style="list-style-type: none"> 187 publications, 280,789 downloads, 7,984 citations Indication of growing number of studies on wetlands A SWAMP online Database has been developed to support further research efforts and inform policy (>100 datasets: maps, soil emissions, vegetation, etc.) SWAMP provided funding for 8 doctoral students to conduct studies on tropical peatland ecosystems Coalition-building improved partners' awareness of research related to wetlands and increased their use of research-based information in their global advocacy and campaigning
Impact	<p>Hectares of forest under enhanced protection; high-end potential 14.3 million ha</p> <p>(Total amount of peatland covered by the PIPPIB, including those covered prior to the PIPPIB policy)</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area 13.4 Gt²²</p> <hr/> <p>Hectares of forest under enhanced protection; low-end estimate 11.2 million ha</p> <p>(11.2 million ha of peatlands newly and solely covered by the PIPPIB)</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area 10.5 Gt</p>
Underlying assumptions	<ul style="list-style-type: none"> Assumes policy targets are realized Illegal deforestation does not take place on peatlands covered by the PIPPIB The PIPPIB is effectively implemented and enforced Land is not lost to fires or other natural disasters FTAs contribution to the PIPPIB was significant enough to have an effect

5.1.3 Fire and Haze in Indonesia Cluster Results

Fire prevention advocacy, policy, and practice change are needed to reduce anthropogenic burning and forest loss from fires in Indonesia, which have been a major contributor to deforestation in the country. As a result, FTA conducted research on fire and haze to provide insights for policy makers, private sector, farmers and communities, and NGOs to move from fire suppression to prevention approaches to reduce instances of fire in Indonesia and corresponding forest loss. FTA research identified actors who benefit directly and indirectly from

²² Due to the same formula used for CO₂ sequestration across clusters for consistency and limitations in data regarding identifying specific land-types, it is likely that the estimated amount of CO₂ is higher than estimated for the Wetlands cluster. Undisturbed peatland and wetlands are known to store more carbon than some other forested land types, therefore, not all potential carbon sequestration may be captured here.

fire and the related land business and encouraged these actors to participate in dialogue and decision-making processes.

Policy: FTA research on fire and haze in Indonesia included a strong outreach component with provincial, national, and international level actors best positioned and prepared to drive meaningful reform in Riau and other fire hotspots. Findings and recommendations were communicated using appropriate language and outlets to be accessible to target users. Public demand (influenced by media uptake), in combination with FTA's contributions to policy, helped to inform governments' development and implementation of regulations on fire prevention. As a result, there is evidence of FTA knowledge being used in targeted decision-making processes, specifically in the drafting of fire prevention legislation at the local and national level. The Director General on Law Enforcement of the KHLK referred to FTA findings on the network of actors responsible for fires and the relation of local politics to forest fires as a scientific finding basis to enforce law. The Director General also indicated that they will use the findings as a catalyst to pursue further investigation. FTA jointly supported the drafting of three documents: 1) Grand Design of Forest and Land Fire Prevention 2017-2019, 2) the Standard for Forest Plantation and Land Fires Prevention, and 3) the Regency and Provincial Regulation on Fire Management and Prevention. FTA authored the white paper that served as the basis for the development of the Grand Design of Forest and Land Fire Prevention (2017-2019), which states that the national total peatland area to be protected from fire is 2.4 million ha by 2020 nationally (ensure that the 731 villages identified by the KHLK as being prone to fire are not burned). The policy discourse effectively shifted from one of fire suppression to fire prevention. This document was prepared based on the establishment of a national target for peat restoration program lead by Indonesian Peat Restoration Agency (BRG) (Decree No.5/BRG/2016), which was later amended (Decree No.16/BRG/2018) to increase the total restoration area to 2.6 million ha. Assuming that the policy is effectively implemented and enforced to fully meet its mandate and large amounts of land are not lost to other natural disasters, 2.4 million ha of peatland have the potential to be better protected from deforestation as a result of FTA contributions to policy discourse and design.

At provincial and regency levels, FTA research initiated PERDAs (local regulation) for fire prevention by equipping sub-national governments with knowledge and capacities to inform local regulations for fire management and prevention. Riau province and Bengkalis district in Riau referred to FTA scientific documents for their local regulation on the forest and land fire control and prevention. Overall, the timing of the research was good with a favorable political climate, which was important in supporting the realization of outcomes and potential impacts.

The public has become aware of the importance of forest and land fires prevention. Targeted dissemination, invitations to speak on national media, and ongoing knowledge-sharing by FTA researchers have brought greater understanding to journalists, the public, the corporate sector, and affected parties in Indonesia, Singapore, and Malaysia about on-the-ground realities of contemporary fires. This increased public awareness has exerted pressure on policymakers to instigate policy change and reduce deforestation by tackling fire and haze issues in Indonesia.

Practice: It was anticipated that the resulting pressure from policy and the public would influence the private sector to commit to the fire prevention agenda and ultimately lead to the private sector no longer using fire in agricultural practices. The private sector's engagement with FTA focused on developing a strategy of sustainable livelihood alternatives for communities that manages peatland as a replacement for unsustainable oil palm and pulp and paper concessions. A MoU was signed between CIFOR-ICRAF and one large palm oil pulp and paper company to focus on this aspect.

The collaborative engagement approach of FTA's research empowered communities and equipped them with knowledge on land management without the use of fire, fire prevention, and peatland restoration. FTA established a partnership with a village in the Bengkalis regency to trial and promote canal blocking as a fire prevention measure and community-based fire models developed by FTA were applied on 11.1 ha of land in Riau. FTA also contributed to the formalization of community-based fire prevention and peatland restoration institutions. With policy change being sufficient to influence practice at the community level and with communities having the

capacity and knowledge to prevent fires and no longer use fire in agricultural farming, it is expected that deforestation as a result of fire would be reduced.

NGO boundary partners have used knowledge produced and co-produced by FTA to bring credibility to their advocacy campaigns and raise attention to the network of actors responsible for forest fires and the need to reduce fires caused by oil palm value chains. FTA also collaborated with WWF to rehabilitate canal blocking regionally, reflecting their support for methods highlighted within FTA research.

Knowledge generation: Research partnerships have strengthened working relationships between FTA and local universities (e.g., University of Riau), built graduate student research capacities, and raised FTA's research profile on the topic, bringing fire-driven deforestation to the fore of both research, media, and policy discussions.

With evidence that FTA has contributed to outcomes relating to farmers and communities, the public, and Indonesian policymakers, there is reason to expect and higher-level outcomes and the potential impacts may also be realized.

Key results of the Fire and Haze cluster identified to date are summarized in Table 5 below.

Table 5: Fire and Haze: Key results to date of outcome realization for potential impact, as well as policy, practice, and knowledge generation impact pathways

Policy Influence	<ul style="list-style-type: none"> FTA research used as input to the Grand Design for Fire Prevention for 2017-2019 Village government confirms allocation of funding for maintenance of peatland restoration Director General on Law Enforcement of KLHK referred to FTA findings on the network of actors responsible for causing fires and the relation of local politics as a scientific basis to enforce law FTA contributed to the drafting of the Standard for Forest Plantation and Land Fires Prevention FTA contributed to the drafting of the Regency Provincial Regulation on Fire management and prevention (based on the academic script prepared by FTA) Initiated PERDAs (local regulation) for fire prevention (Riau province and Bengkalis District)
Practice Influence	<ul style="list-style-type: none"> MoU signed between CIFOR-ICRAF and a large palm oil pulp and paper company committing to fire prevention NGOs (Jikalahari, FORSIBU, WWF) facilitate implementation of fire prevention activities with communities (e.g., sago planting, canal blocking) 99% of 110 farmers surveyed in Dompas, Riau plan to not use fire Community based fire prevention and peatland restoration institutions formalized
Knowledge Generation Influence	<ul style="list-style-type: none"> 30 publications, 19,633 downloads, 271 citations Journalists take interest in science on the topic CIFOR's profile raised on the topic Partnerships with University of Riau undergraduate students support knowledge sharing, networks, and capacity-building
Potential Impact	Hectares of forest under enhanced protection; high-end potential 2.4 million ha (Land protected under the 2017 – 2019 Grand Design for Fire Prevention)
	Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area 2.3 Gt
	Hectares of forest under enhanced protection; low-end estimate 11.1 ha (Community-based fire models applied on 11.1 ha of land in Riau)
	Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area 9×10^{-6} Gt
Underlying assumptions	<ul style="list-style-type: none"> 2017-2019 Grand Design policy is perfectly implemented No burning (anthropogenic or natural forest fires) occurs Assumes that models are effective in reducing fire instances Perfect implementation of policy is needed and enforced to meet targets Community-based fire prevention models are an effective means of preventing fires and subsequent deforestation There may be some overlap with the forest area protected by the PIPPIB, implies possible double counting

5.1.4 Agroforestry Concessions (AFC) in Peru Cluster Results

FTA aimed to support the implementation of agroforestry concessions (AFC), a land tenure mechanism (comprising a 40-year lease) targeted to eligible smallholders in Peru that stipulates restrictions on deforestation. FTA continues to work with and engage governments, NGOs, and local communities to frame challenges and opportunities for the AFC mechanism (e.g., compliance barriers for eligible smallholders), and presented expanded definitions of smallholders and concepts of smallholder heterogeneity to policymakers. Engagement efforts were sufficient to build important relationships with allies to ensure continuity and increased commitment to AFC, including new research questions and advocacy to support future integration of FTA findings into policy.

Policy: FTA worked to build coalitions with key government agencies to align objectives and coordinate action so that the AFC mechanism would realize its potential. FTA provided inputs to AFC technical guidelines; while these inputs were not integrated into the published guidelines, governments continue to invite and involve FTA researchers in AFC dialogue and implementation processes. Regional governments noted that FTA's research was critical to understand how to approach AFC implementation and support arguments to advance AFC issues. Government informants also learned about smallholders' incapacities to comply with AFC requirements and identified the need to address these compliance barriers. FTA successfully aligned the AFC issue with the agenda of national forestry and climate change strategies to garner government interest in agroforestry as a means to mitigate and adapt to climate change. Regional governments and the National Forest and Wildlife Service (SERFOR) now have the capacity to identify AFC eligibility at the meso-level and use or adapt a micro-zoning approach to identify eligible AFCs. In particular, the San Martín regional government moved forward with the technical group working on zoning and issued 14 AFC registration pilots in late 2018, which cover 120 ha. To date, 33 AFC contracts have been registered in San Martín covering an area of 183.56 ha, and there is potential for more to be registered in the future.

Practice: Community engagement and participatory activities (e.g., PGIS) also increased the utility of the research process and FTA outputs for smallholders. 200 participating smallholders learned about the concession mechanism and its requirements, how to register, and know-how for more sustainable agroforestry-based management practices. FTA research contributed to smallholders having a better understanding of the AFC process and viewing the formalization through AFCs to be within their interests. With a greater understanding that deforestation and associated degradation will hurt small producers the most, some smallholders have demonstrated attitudes willing to protect and conserve forests if they can reap economic benefits from sustainable practices. As deforestation is connected to issues of rights, the legal security provided by AFCs gives smallholders responsibility for and a sense of ownership of land so that they will protect the resources on it. The issuing of 33 concessions in San Martín to date is a preliminary indicator of smallholder practice change. With both technical guidelines and pilot initiatives put in place by the government, eligible smallholders are more likely to be incentivized to apply for and be awarded a concession, develop and maintain their capacities to comply with the provisions of the concession, and adopt agroforestry practices.

FTA also supported technical training (e.g., microzoning approach) with various NGOs. As a result, NGOs adopted and applied micro-zoning in their projects and AFC pilots in San Martín which are run in cooperation with regional government authorities. Some NGOs demonstrated an increased commitment to and action around AFCs that would sustain action, regardless of Peru's political agenda. However, NGOs believed AFC contributions to reduced deforestation and improved conservation would take time to manifest, particularly as few pilots have been allocated to date.

Knowledge generation: Researchers were provided with the opportunity to build upon existing skills and field experience on AFCs to ensure mutual learning to contribute to enhanced focus on the topic.

FTA results demonstrated that AFCs have the potential to affect upwards of 120,000 smallholder households, help sustainably manage over 450,000 hectares of forest, and reduce carbon emissions from unregulated activities (including shifting cultivation and illegal logging) by 20 percent across Peru. Aligning the findings with national objectives for climate change was expected to capture government attention and frame the mechanism's value for widespread uptake and implementation by other regional governments in Peru. It is expected that the culmination

of these outcomes would discourage and reduce the amount of forest cut down, increase agricultural productivity for cocoa and coffee in agroforestry systems, and support reforestation in the Peruvian Amazon. These contributions to outcomes provide confidence that the ToC is sound and therefore, there is reason to believe that higher-level outcomes and impacts may also be realized.

Key results of the AFC Peru cluster identified to date are summarized in Table 6 below.

Table 6: Agroforestry Concessions in Peru: Key results to date of outcome realization for potential impact, as well as policy, practice, and knowledge generation impact pathways

Policy Influence	<ul style="list-style-type: none"> Regional governments (San Martín and Ucayali) better understand AFC implementation options and compliance barriers to smallholders SERFOR understands the need to distinguish smallholders in policy (i.e., smallholder heterogeneity) Governments have capacity to identify areas eligible for AFCs using the meso-zoning approach detailed in the technical guidelines San Martín regional government proceeds with a technical group working on micro-zoning San Martín regional government develops 14 AFC registration pilots in late 2018 AFC issue is on the agenda of national forestry and climate change strategies and governments demonstrate interest in agroforestry as a means to mitigate climate change
Practice Influence	<ul style="list-style-type: none"> 200 participating smallholders learned about AFCs (and opportunities), decision-making, registration, and their territory through discussions with the research team and the PGIS activities 14 smallholders in San Martín received AFCs as part of a pilot, adopting agroforestry practices and complying with requirements Enhanced interest on AFCs among NGOs; Some NGOs demonstrated an increased commitment to and action around AFCs New relationship & mutual interest recognized between ICRAF, GGGI, & SPDA to continue collaborative work NGOs confirmed adoption and application of micro-zoning (training provided by project) in their projects and AFC pilots in San Martín, which are run in cooperation with regional government authorities
Knowledge Generation Influence	<ul style="list-style-type: none"> Research used to develop 2 new research proposals to pursue further gaps 5 publications, 3 citations Research capacities developed among research team, some of whom have continued careers in the Peruvian government in natural resource management/climate divisions
Potential Impact	<p>Hectares of forest under enhanced protection: high-end potential 450,000 ha</p> <p>(potential forest to be covered under concessions)</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area 0.4 Gt</p> <p>Hectares of forest under enhanced protection; low-end estimate 183.56 ha</p> <p>(size of the 33 AFC pilots to which FTA contributed)</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area 17.4x10⁻⁴ Gt</p>
Underlying assumption	<ul style="list-style-type: none"> Eligible smallholders register for AFCs AF concession holders comply with regulations (maintain required percentage of forest cover in concession) Successful/sustainable scaling of AFC in study provinces are supported by NGO and government partners Assumes that agroforestry concession reduces deforestation, and regulations are followed

5.1.5 Sustainable Forest Management (SFM) in Mesoamerica Cluster Results

Policy and market pressures are needed for effective community forest management in Mesoamerica. To enhance the conservation of forest resources and socio-economic benefits in Mesoamerica, FTA supported a project that investigated the socio-economic benefits and governance-related constraints and opportunities of community

forestry in the Guatemalan and Nicaraguan contexts, as well as supported participatory germination trials with communities covering twelve community forest concessions with an area of approximately 350,000 ha.

Policy: FTA produced policy recommendations for decision-makers and developed policy briefs to share findings. With targeted dissemination of research to government actors, governments recognized community forestry as a win/win approach to sustainable natural resource management, protection from deforestation, and livelihood improvement. With increased pressure from forest cooperatives, FTA influenced Guatemala's Council for Protected Areas (CONAP) to revise policy involving the renewal of community forest concessions using scientific evidence generated by FTA on community forestry concession socio-economic performance. CONAP took up these findings to inform the technical norms for the community forestry concession renewal process for eligible concessions in the Maya Biosphere Reserve.

Practice: FTA strategically engaged forest cooperatives to support community forest management and equip them to lobby and negotiate concession contracts. For example, the participation of forestry cooperatives and their support in the countries of focus ensured that the research targeted priority constraints and issues, increasing the likelihood that results would be relevant and used. The research also supported forest cooperatives' learning of community priorities and challenges and encouraged bottom-up participation in dialogue with other stakeholders on sustainable community forest management. In Guatemala, FTA's findings that had influenced the technical norms were also used to renew the concession contract for the Carmelita Cooperative, which was successfully renewed in December 2019, giving continued rights to and protection of forest resources within the concession area. It is likely that FTA's influence on policy and contract renewal will also extend to the remaining eight concessions managed by other forest cooperatives as they come up for renewal over the next five years (i.e., between 2022 and 2027).

FTA engaged local communities to participate in the research through training for the germination studies and in feedback workshops to identify transformation pathways. The research supported targeted communities to learn about socioeconomic, sociocultural, and governance aspects of the results, and recognize the need to integrate young people into the process to create the next generation of leaders. Through learning in the participatory workshops, participating communities enhanced their abilities to plan and lobby for protection of their lands and have improved opportunities to participate in future community forestry. The research also supported community practice changes in Petén, Guatemala through experiential training and germination trials. For example, communities participating in the germination studies witnessed the success of the germination trials and subsequently wanted to replant seedlings to restore forest land that had been converted to pasture. There is evidence that the FTA research team worked with communities to develop a planting scheme following the research. Policy influence on technical norm requirements and the renewal of community forest concessions have also trickled down to the community-level, such as affecting the communities involved with the Carmelita Cooperative to adopt more sustainable forest-based practices that limit deforestation.

Knowledge generation: Research capacity was built through FTA's work with bachelor, masters, and doctoral students from local universities in Guatemala and Nicaragua who gained knowledge and training due to the completion of their theses through the project. As a result of capacity-building and the strengthening of new research collaborations and networks, researchers continued to use and build on project data and findings with continuation through a new pilot by a research partner. Agreement was reached with the Rainforest Alliance to use the same methodology to collect data for the remaining unstudied concessions (i.e., Yaloch, San Andrés, La Unión), which provided a complete dataset for active concessions within the Maya Biosphere Reserve in 2017. Also, a masters student involved in the project subsequently went to Belgium to support DNA testing and learn techniques. The research obtained complementary funding from IUCN for policy research.

In the nine active concessions in Guatemala's Maya Biosphere Reserve, which together occupy more than 350,000 ha, deforestation rates were close to zero (0.1% a year), compared to 1% per year in the core zone and 5.5% per year in the buffer zone (2019). The estimation of potential impacts rests on the assumption that all nine active concessions will continue to have low deforestation rates and will be renewed for another 25 years. With

evidence that FTA contributed to all outcomes stated in the cluster ToC, there is reason to expect that potential impacts may also be realized.

Key results of the SFM in Mesoamerica cluster identified to date are summarized in Table 7 below.

Table 7: Sustainable Forest Management in Mesoamerica: Key results to date of outcome realization for potential impact, as well as policy, practice, and knowledge generation impact pathways

Policy Influence	<ul style="list-style-type: none"> • Indication of uptake of findings by CONAP and ACOFOP in advocacy for renewal of community forest concessions in Guatemala • Contribution to renewal of community forest concessions in Guatemala (2019) FTA informed technical documents and revision of technical norms for concession renewal by CONAP (2019)
Practice Influence	<ul style="list-style-type: none"> • Petén communities built capacities on germination via project training • Indication of Petén community involving young people in community organizations for future leadership of community forestry • Cruce a la Colorada community developed a planting scheme (with assistance of the research team) and replanted seeds from the germination trials to restore forest land [unexpected outcome]
Knowledge Generation Influence	<ul style="list-style-type: none"> • No access to bibliometric data • Research collaboration established with Centro Universitario del Petén (6 students involved) • 4 graduate students (3 masters, 1 doctoral) and 6 undergraduate students built research capacities • Continuation of a research pilot in 3 other concessions following project-end
Potential Impact	<p>Hectares of forest under enhanced protection; high-end potential 350,000 ha</p> <p>(through the potential renewal of all 8 other active concessions)</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area 0.3 Gt</p> <p>Hectares of forest under enhanced protection; low-end estimate 55,597 ha</p> <p>(achieved through 1 successful renewal to date)</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area 0.05 Gt</p>
Underlying assumptions	<ul style="list-style-type: none"> • Other active community forestry concessions will be renewed for another 25 years, limiting and maintaining low rates of deforestation • Areas of land covered by concessions remain the same and are not lost to natural disasters or illegal deforestation • Concessions are an effective means to prevent deforestation and forest degradation • Dependent on the renewal of all nine forestry concessions in the Maya Biosphere Reserve

5.1.6 Sustainable Forest Enterprises (SFE) in Cameroon Cluster Results

Improved monitoring capacities are needed to enhance the management of community forests and limit deforestation in Cameroon. Across community forests in Cameroon, where communities have struggled to prevent deforestation and attract investment, FTA helped establish community forest enterprises (CFE), a community-based Field Monitoring System (FMS), and developed a performance-based financing approach to address weak monitoring by conditioning the receipt of financing based on environmental, social development, and enterprise performance.

Policy: Through FTA engagement in policy discussions, there are indications that governments gained a better understanding of issues facing CFEs, such as their lack of status as social enterprises, taxation, and centralized administrative processes (e.g., issuance of permits, waybills, etc.). As a result, the Ministry of Small and Medium Size Enterprises, Social Economy and Handicrafts (MINPMEESA) drafted a MoU with FTA, proposing inclusion of CFEs in the national definition of social enterprises. Through the DRYAD Congress, interactions and dialogue between CFEs and governmental representatives increased to enhance community access to governments (e.g., access to an official government phone number to report or follow up on issues), build mutual understanding regarding their respective perspectives (e.g., reasons for imposing strict regulations on communities to prevent natural resource exploitation), and provide technical advice and administrative assistance (e.g., the Ministry of

Environment Nature Protection and Sustainable Development (MINEPDED) helped CFEs obtain environmental impact notice certificates).

Practice: Communities and CFEs learned about and built capacities in monitoring technology, business, and forest governance through FTA's work on the topic to maintain monitoring and report of CFE performance to access investment. In terms of practice influence, FTA established 34 CFEs from initial business ideas to fully functioning enterprises, 29 of which reported growth after two years of operation, with an additional 84 business cases prepared for investment. Under the performance-based finance approach, only 6% of CFE pilots failed, compared to the average of 90% of SMEs in Cameroon that fail in the first year. With upwards of 100 training workshops offered, 1,955 people (962 men, 993 women) from CFEs and implementing organizations (i.e., NGOs, producer associations) built capacities in technical agricultural skills, business management, and forest governance and monitoring. CFEs successfully used the FMS to track, monitor, and report on performance, being up to 8 times more cost-effective than FTA-led or outsourced monitoring. The combined system and approach enhanced community participation in the management of 85,250.5 ha of community forests, both reducing instances of illegal logging and forest clearance. There is the potential for future scaling of FTA's CFE approach by other communities in currently non-operational community forests which could lead to increased impact.

With evidence that FTA contributed to outcomes related to CFEs and governments, there is reason to believe that the ToC is sound and therefore higher level outcomes and impacts may also be realized.

Key results of the SFE in Cameroon cluster identified to date are summarized in Table 8 below.

Table 8: Sustainable Forest Enterprises in Cameroon: Key results to date of outcome realization for potential impact, as well as policy, practice, and knowledge generation impact pathways

Policy Influence	<ul style="list-style-type: none"> Project initiated policy discussions on relevant issues (e.g., CFEs as a social enterprise, community forestry taxation, decentralization of permit processes, etc.) MoU drafted between MINPMEESA and ICRAF to include CFEs in national definition of social enterprise Enhanced dialogue between CFEs and governments via DRYAD Congress MINEPDED provided technical advice and assisted CFEs to obtain environmental impact notice certificates
Practice Influence	<ul style="list-style-type: none"> 34 CFEs established (84 additional business cases ready for investment) 29 of 34 CFEs reported growth after 2 years of operation Low failure rate within first year (6% compared to national average of 90%) 1955 individuals from CFEs and implementing organizations received training from FTA Successful uptake and use of cost-efficient community-based FMS by participating CFEs Enhanced community participation in community forest management and decision-making
Knowledge Generation Influence	<ul style="list-style-type: none"> 12 publications, 109 citations No citation/download/reads data available for the 4 technical reports/policy briefs
Potential Impact	<p>Hectares of forest under enhanced protection; high-end potential 1.3 million ha</p> <p>(potential for 260 community forests covering 1.3 m ha of secondary forest in Cameroon)</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area 1.2 Gt</p> <p>Hectares of forest under enhanced protection; low-end estimate 85,250 ha</p> <p>(actual achievement, enhanced community participation in the management of 85,250 ha of community forests, both reducing illegal logging and forest clearance)</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area 0.08 Gt</p>
Underlying assumptions	<ul style="list-style-type: none"> Community forests are fully operational Uptake and scaling of the approach as part of the ToC logic: with eventual scaling of the performance-based financing approach and Field Monitoring System by CFEs in Cameroon's community forests

5.1.7 Oil Palm in Indonesia Cluster Results

Policy and market pressures are needed to change unsustainable oil palm production that contributes to deforestation in Indonesia. Oil palm plantations now occupy an estimated 14.6 million ha in Indonesia, approximately a 50% increase from 2010 resulting from the expansion of plantations and forest conversion (Statista, 2021). FTA undertook research to better understand Indonesia's governance of and policy processes for oil palm management, with the aim to support improved policies and practices in favor of more environmentally conscious and socially inclusive oil palm development. FTA produced new knowledge and leveraged the reputation of CIFOR to support constructive dialogues and collective action within the oil palm sector.

Policy: Government actors had positive impressions of their involvement in FTA research projects. Through FTA's targeted engagement and knowledge-sharing, local government agencies at the district and provincial levels have an improved understanding of the consequences of oil palm expansion on landscapes and people. Increased advocacy by partners and allies and enhanced consumer awareness have begun to place pressure on governments and oil palm companies to change policy and practice, which are expected to gain more momentum over time. Some targeted policy changes have begun at the provincial level (e.g., a provincial regulation (PERDA) in East Kalimantan) and international level (e.g., the Roundtable for Sustainable Palm Oil's (RSPO) reflection on gender considerations), and there is evidence of FTA contributions to national policy processes currently underway (e.g., ISPO, RANKSB). For example, FTA researchers provided inputs to refine ISPO criteria, indicators, and certification mechanisms, and were invited by the European Parliament as part of its work on a Resolution on Palm Oil and Deforestation of Rainforests to share findings to inform the debates. Through FTA's role-playing game simulations, government stakeholders learned about different typologies of smallholders involved in oil palm production and the realities and challenges they face with regard to ISPO compliance; this understanding is expected to be incorporated into ISPO in the future with ongoing support and engagement from FTA researchers. However, while certification schemes have potential to curb deforestation, previous studies have shown that RSPO and ISPO have been ineffective in curtailing oil palm plantation-driven deforestation (Hidayat et al., 2018; Amalia et al., 2019), and leakage from certification can reduce deforestation in certain zones but increase it in others (Heilmayr et al., 2020). Other FTA outputs have been useful for governments to learn and better understand land-use change within their jurisdictions (e.g., Borneo and Papua Atlas tools, large-scale vegetation maps in West Kalimantan). These spatial visualizations enabled provincial governments to verify concession boundaries when issuing permits and monitoring existing permits to trace the level of deforestation over time. In East Kalimantan, FTA supported multi-stakeholder dialogue on the inclusion of HCV provisions in oil palm concessions. FTA also assisted partners to develop an academic script on HCV to feed into East Kalimantan's PERDA process, which was subsequently taken up by the provincial government to include HCV provisions in PERDA No.7/2018 on Sustainable Plantations. There is also evidence of intended future use of FTA's HCV maps in the accompanying governor regulation (e.g., PERGUB).

Practice: FTA and partner contributions to PERDA No.7/2018 mandated a shift in private sector practice to reduce ecologically destructive activities (i.e., establishing plantations in HCV areas) and companies are legally required to abide by the law. FTA engaged oil palm companies to share data and instill understanding of the ecological and social consequences of oil palm expansion. Some companies have taken steps to better understand FTA's research as a result. For example, Wilmar requested a meeting with FTA researchers to compare data from the Borneo Atlas with company data on concession boundaries. To support oil palm corporations to adopt more sustainable and inclusive business models, FTA also facilitated and participated in multi-level stakeholder engagement platforms to involve the private sector at national and subnational levels. While initial progress was made with the Indonesian Platform on Oil Palm (IPOP), the disbandment of IPOP limited FTA's access to and influence on private sector actors. Yet, it is possible that smallholders, oil palm companies, farmers associations, and other private sector intermediaries learned about oil palm-related deforestation and emissions, sector challenges and opportunities, good agricultural practices, and smallholder heterogeneity through other workshops, events, and meetings hosted by FTA. There is also the potential that changes in knowledge on sustainable oil palm production via FTA research activities could lead to smallholder farmers changing their

practices. FTA also developed a typology of oil palm smallholders to support better targeted efforts to change smallholders' practices by donors, GoI, and advocacy organizations. As a result of better policy and improved practice across the private sector, smallholders are expected to adopt better agricultural practices and be better able to comply with sustainability standards to contribute to reduced deforestation. However, there is limited evidence of this outcome to date. There is preliminary evidence that partners' use of FTA outputs in advocacy have successfully held companies to account and increased pressure on the private sector to uphold their zero-deforestation commitments. Previous research suggests that companies, particularly large-scale operations, have high commitment to complying with regulations and acting in a careful manner in their operations (Purnomo et al., 2021). The private sector is motivated by maintaining their credibility and reputation in international markets by pursuing certificates and ensuring sustainable practices. However, the realization of environmental benefits is contingent on the implementation and enforcement of policy, a complex process in and of itself.

Through targeted engagement, relationships between partners were strengthened, and new relationships were built with stakeholders and communities involved in FTA's research. Partner organizations have also used FTA research to inform planning decisions and project development and use tools to make better evidence-based decisions. For example, there is evidence that the Mills Database and the Borneo Atlas have been used by NGOs to advocate for and pursue oil palm issues in their campaigns and hold the private sector accountable to their deforestation commitments. Notably, Greenpeace used the Atlas in two of its campaign reports – one of which was submitted to RSPO in a claim against a private company's deforestation. The company which Greenpeace filed their complaint against responded publicly by offering to compensate for the land that had been illegally deforested. Allies like IUCN have also used the Atlas in an action plan for sun bear conservation. As a result, partners and allies championed the work to support the scaling up of FTA tools and outputs as part of the collective effort to reduce deforestation due to oil palm expansion.

Knowledge generation: FTA provided new framing of oil palm issues, new data and analyses including maps and visualization tools, and developed researcher capacity. As a result, there is a greater foundation of knowledge on which to advance oil palm research. FTA utilized multiple targeted dissemination methods to spread awareness of FTA findings among academic audiences to provide the wider science community with access to data and analyses, which has stimulated new questions on the topic. There has been extensive documented use of data from the Borneo Atlas on deforestation and plantations by international researchers and graduate students. Researchers, students, and research partners (including researchers from local universities, NGOs, and government research agencies) developed their capacities, such as spatial analytical skills, gained expertise in the topic, and applied lessons from the research experience into their work to advance oil palm issues. Indonesian students continue to work in related oil palm topics or natural resource management and have been invited as experts to support policy dialogues.

With improved practices by companies and smallholders, and assuming the perfect application of zero-deforestation commitments, national and international certification schemes, as well as better governance and management of forests, Indonesia's oil palm sector is expected to reduce oil palm expansion-driven deforestation. With the perfect application of the PERDA in East Kalimantan, 2 million hectares of HCV are under enhanced protection from deforestation. These potential impacts are built on the assumption that the policies and certification mechanisms restricting deforestation for oil palm production are effectively enforced with monitoring, though evaluation of these mechanisms remain weak, but are a focal point for future research.

Key results of the Oil Palm in Indonesia cluster identified to date are summarized in Table 9 below.

Table 9: Oil Palm: Key results to date of outcome realization for potential impact, as well as policy, practice, and knowledge generation impact pathways

Policy Influence	<ul style="list-style-type: none"> FTA findings contribute to revisions of RSPO principles and criteria on gender Subnational PERDA No. 7 (provincial regulation) and PERGUB (implementing guidelines) reflect high conservation value areas Subnational governments use FTA spatial maps to verify licenses Indications of FTA engagements in RANKSB and ISPO processes (e.g., refining ISPO criteria)
-------------------------	---

	<ul style="list-style-type: none"> FTA findings included in 2023 Spatial Plan of West Kotawaringin FTA invited to provide inputs for debates generated by European Parliament Resolution on Palm Oil and Deforestation of Rainforests
Practice Influence	<ul style="list-style-type: none"> RSPO member companies comply with new regulations to be more inclusive (in order to uphold RSPO certification requirements) NGOs use FTA research to strengthen evidence bases of sustainability campaigns in oil palm and other commodities (e.g., Greenpeace used Borneo Atlas to hold RSPO companies accountable to zero deforestation commitments) FTA contributed with partners to the discussions on inclusion of HCV provisions in the PERDA No. 7. Implies management and preservation of high conservation areas when managing/establishing oil palm plantations
Knowledge Generation Influence	<ul style="list-style-type: none"> 66 publications, 61,246 downloads, 688 citations CIFOR top contributor to gender in oil palm topic, academic discussion gaining traction 6 OPAL graduate students build research capacities OPAL students invited as experts to support community and government processes Documented use of data from Borneo Atlas on deforestation and plantations by international researchers and graduate students 24 out of 26 CIFOR-USAID Fellowship (CUF) graduate students build research capacities 11 continue to work in natural resource management
Potential Impact	<p>Hectares of forest under enhanced protection; high-end potential No evidence found in available documentation</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area Not assessable, as no evidence on high-end potential found in available project documentation</p> <p>Hectares of forest under enhanced protection; low-end estimate 2 million ha</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area 1.9 Gt</p>
Underlying assumptions	<ul style="list-style-type: none"> With improved practices by companies and smallholders, and assuming the perfect application of zero deforestation commitments and palm oil moratorium, as well as better governance and management of forests, Indonesia's oil palm sector is expected to reduce oil palm expansion driven deforestation Oil palm moratorium is implemented, enforced, and maintained to reach its potential

5.1.8 Sustainable Forest Management (SFM) in the Congo Basin Cluster Results

For sustainable forest management (SFM) in the Congo Basin, policy and market pressures, as well as viable agroforestry options are needed to reduce deforestation across the region. FTA worked predominantly in DRC, Cameroon, and Gabon, with diverse focus points, ranging from research on value chains and the socio-cultural relevance of indigenous tree species and threats, capacity-building and training, as well as the establishment of multi-stakeholder fora, and support to boundary partners for tree-planting activities to reduce deforestation rates in the region. FTA research also provided new knowledge on issues such as carbon finance, improving rural livelihoods, forest governance, and on how existing agroforestry systems can be intensified and improved for local farmers.

Policy: By providing policy actors with knowledge and training through the collaborative process (e.g., ad hoc training on GIS, remote sensing, statistics, project management, forest policy and governance, etc.), FTA strengthened the capacities of Ministries responsible for forest management. FTA also co-developed policy recommendations with Cameroonian and Gabonian government representatives during a policy workshop. As a result, FTA contributed to policy recommendations for multiple use forest management, legislation, regulation, and social responsibility contracts which are being promoted and used to influence the implementation of legislations and regulations including forestry laws in Cameroon, Gabon, and the DRC. For example, FTA contributed to modifications of the Forest Code, No. 94/01 of 20 January 1994 that provides clear orientations toward sustainable forest use in Cameroon including recommendations for multiple use forest management, legislation, regulation and social responsibility. The 1994 Forest Code states that permanent forests shall cover at

least 30% of the total area of the national territory (11.73 million ha) and reflect Cameroon's ecological diversity; though this policy and target was established prior to FTA. Policy outcomes rely on the continuous promotion and use by institutions such as the Commission of African Forests (COMIFAC) to influence legislations and regulations on SFM in the Congo Basin. COMIFAC has taken measures to incorporate FTA recommendations for forest management at the regional level. For example, final declarations of two steering committee meetings chaired by COMIFAC support the relevance of FTA's work for Ministries in charge of forests in the Congo Basin. COMIFAC endorsed and was engaged in the dissemination of all project outputs in regional and international meetings, and after project end, COMIFAC proposed a second phase of the project.

Practice: FTA also contributed to the training of timber company staff and shared knowledge produced by the research to increase awareness among logging companies regarding the local values of forest areas through dialogues and outreach. With increased awareness, timber companies are expected to develop an interest in adopting FTA recommendations on SFM. With the adoption of FTA recommendations (including those on forest management practices mutually beneficial for the private sector and communities) and increased pressure from government policies, timber companies will move towards more sustainable management plans that reduce deforestation and forest degradation in the Congo Basin. There is limited evidence of this outcome to date.

Through targeted community engagement and knowledge dissemination activities (e.g., consultative and verification processes of findings and disseminating results in appropriate means), improved infrastructure, and relevant recommendations for mutually beneficial forest management practices, communities gained greater awareness of SFM and were supported through the development of new jobs. Local associations and individual champions helped with further awareness-raising, resulting in the uptake of agroforestry practices. FTA research also provided communities with knowledge on how agroforestry systems can be intensified and improved for local farmers. Along with the increased pressure from government regulations and NGOs, over time, forest ecosystems and biodiversity are better maintained and pressures on forests are lifted as more communities adopt agroforestry-based practices in the Congo Basin. For example, a successful MoU was signed between ICCN and Mashu community to relocate cows off Virunga National Park for grazing on local farmland to minimize deforestation in the region. However, building trust and changes in behaviours amongst forest communities and forest concessionaires takes time (i.e., beyond a project cycle of three or four years).

Project collaborators (including donors and international institutions) gained major insights into the ways forest communities use forest resources and the relationships between communities and concessionaires, as well as learned about the status and trends of priority tree species within concessions and around villages through FTA research. Partnerships with NGOs (e.g., WWF) were strengthened through collaborative activities such as planting, research collaborations, and research training/capacity-building. Overall, FTA stimulated partner organizations to implement agroforestry plantations and restore and manage degraded forests across the Congo Basin. With NGOs and allies supporting FTA research and awareness-raising activities on SFM in the Congo Basin, there is increased pressure on governments to implement and enforce policies to reduce deforestation and forest degradation through SFM practices.

Knowledge generation: FTA research supported the capacity-building of staff, masters and doctoral students in the Congo Basin (e.g., University of Kisangani (UNIKIS) to support continued future research on the topic, as well as the development of a curriculum related to SFM which was applied and expanded. Furthermore, trainings have been offered to more than 1,200 candidates from diverse institutional backgrounds. University infrastructure was also improved through construction and building enhancements to improve working and study conditions. By cultivating transferable skills through FTA-supported activities, staff and students are better equipped to continue work in related careers in academia, the private sector, and government, to promote SFM and reduce deforestation and forest degradation in the Congo Basin. By focusing on the in-country capacity for research and development, FTA contributed to a solid foundation for future research and subsequently to the improvement of sustainable management of protected areas and the preservation of biodiversity. FTA contributed to modifications of the already existing Ministerial Order No 034 of 5 October 2006 on the composition, organization and functioning of provincial advisory boards of forests where forestry specialists are required in every region (e.g.,

to enhance personnel with capacity in forestry which has been a challenge in the DRC). The strengthened infrastructure will also be key in training more personnel and students in forestry and SFM, therefore availing capacity that will participate in future provincial advisory boards of forests. These capacity-based contributions are also expected to indirectly shape future policies on SFM in the DRC assuming that forestry specialists continue to work in the Congo Basin and do not leave for improved financial opportunities.

Evidence suggests that outcomes relating to researchers, policymakers, timber companies, and communities have been realized providing confidence that higher level outcomes and impacts may also be realized in the future.

Key results of the SFM in the Congo Basin cluster identified to date are summarized in Table 10 below.

Table 10: Sustainable Forest Management in the Congo Basin: Key results to date of outcome realization for potential impact, as well as policy, practice, and knowledge generation impact pathways

Policy Influence	<ul style="list-style-type: none"> • Indication that FTA research contributed to national management standards and legislative frameworks for SFM in the Congo Basin • Contribution to the already established Ministerial Order No 034 of 5 October 2006 in DRC on the composition, organization, and functioning of provincial advisory boards of forests where forestry specialists are required in every region • Policy recommendations for multiple use of forest management, legislation, regulation, and social responsibility contracts are being promoted and used to influence/contribute to implementation of legislations and regulations including forestry laws in Cameroon, Gabon, and DRC e.g., contributing to implementations of 1994-to-land-use-and-forest-management-regulations in Cameroon • COMIFAC endorsed and supported dissemination of FTA recommendations for forest management practices • COMIFAC proposed second phase of AFDB Project
Practice Influence	<ul style="list-style-type: none"> • MoU signed between the ICCN and Mashu community to relocate cows off Virunga National Park for grazing on vacant farmland • Successful collaborative relocation of 2900 people from Virunga National Park to Walesse Vonkutu community • Local associations and individuals support awareness-raising and/or take up agroforestry practices • Multi-stakeholder workshops/ engagement opportunities for knowledge-sharing and participatory knowledge co-development established
Knowledge Generation Influence	<ul style="list-style-type: none"> • 25 publications, 8799 downloads, 93 citations • Integration of SFM and climate change topics in curriculum of Master program at UNIKIS • DRC: More than 1200 participants from various institutions received training (e.g., MECNT, ICCN) • >70 graduate students built research capacities • 6 applied research programs in forest management and biodiversity conservation were initiated in partnership with Congolese and international institutions (South-South and South-North exchanges)
Potential Impact	<p>Hectares of forest under enhanced protection; high-end potential No evidence found in available project documentation</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area Not assessable, as no evidence on high-end potential found in available project documentation</p> <p>Hectares of forest under enhanced protection; low-end estimate No evidence found in available project documentation</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area Not assessable, as no evidence on low-end estimate found in available project documentation</p>
Underlying assumptions	<ul style="list-style-type: none"> • Assumes government pledges are met • Researchers and staff continue to focus their work on improving SFM in the Congo Basin • FTA contributions to the awareness raising among timber companies was substantial enough to change their practices • Tree planting efforts successfully reduce pressure on the Virunga National Park

5.1.9 FLEGT/VPA Cluster Results

FTA aims to promote the establishment of FLEGT compliance which will ultimately decrease illegal logging and, hence, uncontrolled deforestation. In the FLEGT/VPA cluster, the projects with a considerable relevance for the deforestation challenge are predominantly working in African countries²³. FTA generated findings on the genetic sampling of tree species for developing DNA tools for timber tracing, inputs to the FLEGT mechanism, as well as the functioning of local value chains and markets. FTA projects offered solutions to enhance the demand for legally-sourced timber in production countries, supported local capacity-building for designing and assessing FLEGT/VPA-related activities, and identified policy-relevant and associated options for reform. Research and related activities also aimed to build research and administrative capacity, and to ensure effective outreach and dissemination of findings. Strong partnerships were built, both among research partners and with the policy communities of the countries engaged by FTA research. Stakeholder engagement was widespread and effective, and included the building of relationships with actors along the wood value chain. FTA research was particularly strong in targeting important actors who would not normally have a voice in public policy. Relevant state (e.g., local, national, and regional governments) and non-state actors (e.g., private sector, practitioners, and consumers) were equipped with knowledge, tools, skills, and policy and regulatory options to reduce deforestation by tackling illegal logging and were engaged in informed multi-stakeholder dialogues to identify policy priorities, responsibilities, and implementation mechanisms.

FTA research is universally recognized in the target countries as authoritative and of high-quality. Assuming that stakeholders have an interest in obtaining legal timber and are willing/ready to change their behavior, by engaging diverse stakeholder groups to the importance of obtaining timber of legal origin, FTA research makes it possible to popularize the need for sustainable forest management and contribute to a reduction in deforestation due to illegal logging.

Policy: As a result of these contributions, some policymakers across Africa created new or adapted existing policy on the legal procurement of timber and gained improved monitoring capacities. However, providing policy relevant options was achieved to varying extents depending on geography. For example, an array of policy options were developed and implemented in Cameroon, while this was only partially achieved in the DRC. Multi-stakeholder platforms with the Government of Cameroon and submissions of policy briefs and papers by FTA led to the drafting of policies, such as the development of a new Forest Law and a draft national public policy for the supply of legally-sourced sawn timber. Existing regulations were also simplified to make them more accessible to and cost-effective for small operators. In Cameroon, FTA research also contributed to a joint MINFOF-MINMAP-MINTP decree on the use of timber of legal origin in public procurement, which was prepared and submitted to the Prime Minister, which if adopted, could have lasting effects on the sourcing of legal timber for public contracts. In Côte d'Ivoire, FTA provided knowledge on the implementation of public procurement policies aimed at making the use of legally sourced wood mandatory in public works by filling knowledge gaps on the types and volumes of timber supplied on the domestic market, quantification of demand for timber, and a series of recommendations on how to increase and secure the supply of legal timber. Although these outputs have potential applicability to the Côte d'Ivoire political sphere, no policy changes have yet been observed.

Practice: FTA's research and engagement activities also influenced practice, supporting the formalization of the informal SME sector across target countries by improving their capacities to comply with FLEGT legality requirements. Through combined campaign efforts by FTA and partners (e.g., ANCOVA), over 381,685 people were reached, sharing learning about legal origin supply chains, fast-growing timber agroforestry systems, and sustainable timber extraction management, among other timber processing and marketing strategies. In Cameroon, FTA engagement with private sector actors involved with timber supply chain management (e.g., SGS, Helveta) influenced revisions of companies' existing traceability contracts, which now feature smallholders,

²³ FTA has been working on FLEGT/VPA in countries in other continents, most notably in Indonesia and Ecuador; however, only evidence of FTA's influence in West and Central Africa is presented for Challenge 1.

chainsaw millers, and traders as part of the formal supply chain. FTA also shared resources with 17 construction companies, enhancing their understanding of legal timber supply. In 2021, FTA launched a reforestation campaign with support of MINFOF to plant 100,000 trees in the municipalities of Okola and Evodoula to combat deforestation and forest degradation. In Ghana, FTA piloted different business models and traceability systems with three companies (e.g., GOPDC, Serendipalm, Rubber Plantations Limited) to improve supply chain monitoring. Community pilots and capacity-building activities in DRC and Kenya supported awareness-raising, farmer-to-farmer knowledge transfer and skills-building (e.g., farmer-managed natural regeneration (FMNR), sustainable wood and charcoal production, etc.), and participatory land-use mapping and management planning. In Zambia, FTA piloted assisted natural regeneration (ANR) trials and restoration options in forest reserves with government departments. By equipping SMEs and small-scale loggers to reduce illegal logging rates and take up more sustainable timber extraction practices, the market will shift accordingly²⁴. This trend is likely to continue, notably in production forests mandated to have management plans, which are now better implemented than in the past. The combination of top-down governance and bottom-up practice changes have positive implications for both domestic and global legal timber supply. With greater transparency in the forest sector, domestic and global demand for legal timber has also shifted. For example, Cameroonian forestry products now have a better image in EU markets; with a more favorable export environment, there are greater financial incentives to support sustainable forest management and decreased uncontrolled illegal deforestation.

Targeted engagement and collaborative relationships resulted in NGO and CSO partners' support in the implementation of and private sector compliance with these policies. FTA research strengthened CSOs' understanding of and capacity to implement territorial approaches, while also contributing to the development of institutional structures and collaborative relationships. As a result, CSOs use the knowledge to more effectively engage private sector and governments and to ensure that adopted interventions contribute to local needs and broader national goals, including minimizing illegal deforestation. For example, FTA reports on FLEGT are now being used by FODER in Cameroon to develop proposals for studies on chainsaw operators and community livelihoods. FTA's engagement with Ghana's National Cocoa Board (COCOBOD) led to a new collaboration to support the National Cocoa Replanting and Agroforestry Program. In DRC, an NGO (e.g., Ocean) liaised with FTA researchers and drew upon findings to inform its sensitization programme on FLEGT.

Knowledge generation: By supporting masters' (6 in Cameroon; 1 in DRC; 1 in Gabon); and doctoral students (1 in Cameroon; 1 in DRC), as well as contributing to university training programs and partnership arrangements (including in Germany, Belgium, Netherlands, USA), FTA built national research capacities to advance the topic of FLEGT in the region. With the assumption that researchers will continue to focus on the topic within target countries and put their learning into practice, this capacity-building helps promote and advance research on FLEGT and timber markets to reduced illegal logging.

Overall, greater transparency in forest sectors and improved transparency in the operation of FLEGT licensing schemes are likely to decrease deforestation through the successful capacity-building of stakeholders. However, there is no evidence of potential impact metrics through FTA work to date. Across FTA project geographies, it is assumed that enhanced regulated and sustainable timber production via new policy will lead to decreased illegal logging and increased demand of legal sawn wood for public procurements with large-scale timber companies and SMEs complying with new regulations. The implementation of public policy for the purchase of legal timber is expected to improve the supply of legal timber on the market and reduce deforestation. With evidence that FTA has contributed to outcomes related to policymakers, timber companies, NGOs and CSOs, and researchers there is reason to expect that the ToC is sound and higher level outcomes and impacts may be realized in the future.

Key results of the FLEGT/VPA cluster identified to date are summarized in Table 11 below.

²⁴ For example, in Cameroon, the share of illegal timber in export market fell from 52% to 41% as a result of VPA, and the share of illegal timber in domestic market fell from 68% to 61%. In Ghana, the share of illegal timber in export market fell from 51% to 31% as a result of VPA, while the share of illegal timber in domestic market fell from 67% to 50%.

Table 11: FLEGT/VPA: Key results to date of outcome realization for potential impact, as well as policy, practice, and knowledge generation impact pathways

Policy Influence	<p>Cameroon:</p> <ul style="list-style-type: none"> Submission of FTA policy brief to the government contributed to the development of the new Forest Law and a briefing paper for DEVCO Contribution to New Forest Law and draft national public policy for the supply of legally sourced sawn timber A draft national public policy for the supply of legally-sourced sawn timber and a conjoint draft decree of MINFOF, MINTP, and MINMAP on the use of timber of legal origin in public procurement in Cameroon have been drawn up and submitted to the prime minister
Practice Influence	<ul style="list-style-type: none"> Formalization of previously informal SMEs FTA film reached 381,685 people ANCOVA led promotional campaigns in 15 urban markets <p>Cameroon:</p> <ul style="list-style-type: none"> Campaigns on legal timber 17 construction companies enhance understanding of legal timber supply Influenced companies' traceability contracts Launch of reforestation campaign in Okola and Evodoula <p>DRC:</p> <ul style="list-style-type: none"> NGO liaised with FTA researchers, using findings to inform their sensitization program Community pilots and capacity-building <p>Ghana:</p> <ul style="list-style-type: none"> Business model pilots with 3 companies to improve management and adoption of good agricultural practices New collaboration to support COCOBOD's National Cocoa Replanting and Agroforestry Program <p>Kenya:</p> <ul style="list-style-type: none"> Community pilots and capacity-building <p>Zambia:</p> <ul style="list-style-type: none"> Piloted ANR trials and restoration options in forest reserves
Knowledge Generation Influence	<ul style="list-style-type: none"> 112 publications, 145,020 downloads, 1,474 citations Greater understanding in science of internal markets in tropical timber producer states (Cameroon, Gabon, Ecuador, Indonesia, DRC) Contribution to national research capacities through integration of students and doctoral candidates in diverse target countries (Ecuador, Indonesia, Cameroon, DRC, Gabon) FTA reports on FLEGT now being used by FODER in Cameroon to develop proposals for studies on chainsaw operators and community livelihoods
Potential Impact	<p>Hectares of forest under enhanced protection; high-end potential No evidence found in available project documentation</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area Not assessable, as no evidence on high-end potential found in available project documentation</p> <p>Hectares of forest under enhanced protection; low-end estimate No evidence found in available project documentation</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area Not assessable, as no evidence on low-end estimate found in available project documentation</p>
Underlying assumptions	<ul style="list-style-type: none"> Assumes that transparency in data incentivizes licensing Policymakers are interested in and use evidence-based recommendations Policies are effective and sustained to contribute to reduced deforestation A significant segment of the public and consumers are ready and have the capacity to purchase legal timber Stakeholders are willing to change their behaviour Researchers continue to focus on the topic in target countries and put their learning into practice

5.1.10 Sustainable Forest Management (SFM) in Mozambique Cluster Results

To conserve miombo woodlands in Mozambique, FTA supported a project that investigated the damaging effects of fire and honey harvesting practices on important tree species in the Niassa National Reserve (NNR) and

developed recommendations for reserve managers and communities to more sustainably manage and conserve Reserve tree cover. FTA also co-developed community guidelines for traditional sustainable honey harvesting approaches. While there is no evidence of policy influence to date, the project contributed to practice change and influenced knowledge generation pathways.

Practice: FTA research contributed to reserve managers learning about unsustainable honey harvesting practices and solutions using alternative methods, including the connection between unsustainable honey harvesting with fire frequency and tree felling. The Wildlife Conservation Society also requested research results in various languages so that they could use and share the information with other organizations. As a result of knowledge sharing and capacity-building, Reserve staff and natural resource managers gained critical knowledge and practical guidelines to improve conservation and livelihoods in miombo forests through better management of forest resources. There is evidence that the research strengthened the capacity of NNR management (SGDRN) to effectively meet conservation and community development objectives. Yet, turnover of Reserve management occurred at the end of the project and further investigation is required to assess whether knowledge and capacity gains evidenced with SGDRN have been transferred to the new Reserve management. Knowledge derived through FTA research is also expected to be of value for resource managers in other African countries with extensive miombo woodlands who face similar challenges of reconciling livelihood needs with resource constraints, presenting the opportunity for scaling up for further impact. There is no evidence of this potential scaling to date.

FTA supported local communities in having critical knowledge and practical guidelines to improve conservation and livelihoods in miombo forest through better management of forest resources. This has helped empower local communities. Moreover, there is evidence of honey harvesters' learning and testing of traditional approaches to be more sustainable, as well as evidence of changes in community practices using traditional honey harvesting (e.g., uptake of traditional honey harvesting practices by 9 groups of honey hunters). These practice changes are eventually expected to contribute to reducing deforestation via sustainable management and conservation of miombo woodlands in Mozambique.

Knowledge generation: Research capacities were built in efforts to stimulate a critical mass of Mozambican researchers in sustainable forest management and advance research on forest resource conservation. For example, nine local participants gained research skills (e.g., socio-economic data collection), and masters students (four), junior researchers (four), senior researchers from IIAM (three), one professor, one post-doctoral researcher at BOKU, and two Bioversity researchers, built research capacities and gained knowledge about sustainable forest management of miombo woodlands and forest resources. There is also evidence of use of FTA results/lessons by a local researcher on traditional sustainable honey gathering practices to teach schoolteachers and student groups about the environment in Niassa Reserve.

With FTA contributing to outcomes regarding reserve managers, communities, and researchers, there is reason to expect that the sound ToC logic will contribute to the potential realization of higher level outcomes and impacts in the future.

Key results of the SFM in Mozambique cluster identified to date are summarized in table 3 below.

Table 12: SFM in Mozambique: Key results to date of outcome realization for potential impact, as well as policy, practice, and knowledge generation impact pathway

Policy Influence	No evidence found in available documentation
Practice Influence	<ul style="list-style-type: none"> • Reserve managers learned about unsustainable honey harvesting practices and solutions using alternative traditional methods • Uptake of traditional honey harvesting practices by 9 groups of honey hunters • Community monitoring agents increase capacities to monitor logging and honey harvesting • Wildlife Conservation Society requested access to research results to share with other organizations • Strengthened capacity of NNR management to effectively meet conservation and community development objectives

Knowledge Generation Influence	<ul style="list-style-type: none"> No access to bibliometric data 15 researchers built research capacities (including 4 local and 1 international graduate students) 9 local participants gained ethnobotanical and socio-economic training Uptake of findings on traditional sustainable honey harvesting practices in local educational materials
Potential Impact	<p>Hectares of forest under enhanced protection; high-end potential No evidence found in available project documentation</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area Not assessable, as no evidence on high-end potential found in available project documentation</p> <p>Hectares of forest under enhanced protection; low-end estimate No evidence found in available project documentation</p> <p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area Not assessable, as no evidence on low-end estimate found in available project documentation</p>
Underlying assumptions	N/A

5.1.11 Timber Markets in Sub-Saharan Africa Cluster Results

Better availability of monitoring data, understanding of timber markets, and more value-addition in local supply chains are needed to improve incentives for sustainable timber markets. To reduce illegal timber trade in Sub-Saharan African countries like Cote d'Ivoire, Cameroon, Gabon, DRC, and Zambia, FTA conducted a series of projects investigating and taking stock of informal timber markets and cross-border trade. Some of the projects identified solutions for timber monitoring/tracing, enhanced value chains, and produced policy recommendations to improve the participation of smallholders and SMEs in formal markets.

Policy: FTA influenced policy in Cameroon and Zambia. In Cameroon, the Ministry of Forests and Wildlife established a task force for the purposes of monitoring urban timber flows and tracing corruption, though a key expected outcome of uptake of project methods to record timber flows by the task force has not yet been realized. Indications of policy influence in Zambia include the forest department's reference to a project output and potential uptake and use of other findings that prompted a call for a national charcoal "*indaba*" and subsequent development of a draft policy on charcoal production and trade. There is the indication that Zambian charcoal producers and traders are equipped to lobby government for better policy and they have increased capacity to produce 'green charcoal' through the draft standalone policy on charcoal production and trade in place. Overall, FTA's findings on the topic have supported governments in better understanding the status of timber commercialization by CFEs and formal associations of chainsaw millers in Cameroon and Zambia, and of the main related enabling or impeding factors faced by them. Through taking up FTA knowledge and using product outputs, governments are expected to improve regulations to better enable community forest products and timber commercialization in the future.

Practice: There are also indications of practice influence, such as learning and increased capacities of timber associations in Cameroon as well as increased capacities of charcoal producers and traders to lobby governments and/or produce more sustainable charcoal. There is also an indication that Cameroonian timber associations have become government partners (e.g., ANCOVA, ANTAV), who now have a voice in political debates regarding the formalization of artisanal chainsaw milling. These changes in policy and practice are expected to reduce deforestation that occurs because of illegal timber trade and to secure and formalize artisanal logging in Central Africa.

Knowledge generation: Through the involvement of graduate students and research partners, it can be expected that the research would have influenced the capacity-building of graduate students and research partners to advance timber market research. There is limited evidence of this outcome to date.

However, with FTA contributing to outcomes regarding governments and researchers, the sound ToC logic provides reason to expect that higher level outcomes and impacts may also be realized in the future.

Key results of the Timber markets in Sub-Saharan Africa cluster identified to date are summarized in Table 13 below.

Table 13: Timber markets in Sub-Saharan Africa: Key results to date of outcome realization for potential impact, as well as policy, practice, and knowledge generation impact pathways

Policy Influence	<p>Cameroon:</p> <ul style="list-style-type: none"> Ministry of Forests and Wildlife established a task force to develop methods to record timber flows in urban markets <p>Zambia:</p> <ul style="list-style-type: none"> Forest department referred to an output on livelihood contribution of charcoal production and trade on disadvantaged women Indication of uptake of findings by the national government, prompting for a national charcoal indaba Indication of draft policy on charcoal production and trade in progress
Practice Influence	<ul style="list-style-type: none"> Indication of learning and capacity development by Cameroonian timber associations (e.g., ANCOVA) Indication that Cameroonian timber associations become government partners (e.g., ANCOVA, ANTAV) Indication that Zambian charcoal producers and traders are equipped to lobby government for better policy Indication of increased capacities to produce 'green charcoal' by Zambian producers
Knowledge Generation Influence	<ul style="list-style-type: none"> 5 publications, 570 downloads, 40 citations
Potential Impact	<p>Hectares of forest under enhanced protection; high-end potential</p> <p>No evidence found in available documentation</p>
	<p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area</p> <p>Not assessable, as no evidence on high-end potential found in available project documentation</p>
	<p>Hectares of forest under enhanced protection; low-end estimate</p> <p>No evidence found in available documentation</p>
	<p>Estimated amount of CO₂ emissions (Gigatons) avoided from this forest area</p> <p>Not assessable, as no evidence on low-end estimate found in available project documentation</p>
Underlying assumptions	N/A

5.2 Impact Estimation

Overall, there is evidence that FTA research and engagement has contributed to the enhanced protection of **25.6m ha (low-end estimate)** of forests from deforestation and forest degradation in the countries assessed to date (e.g., area under and influenced by FTA projects, and area of land newly covered under forest protection policies and tools to which FTA directly contributed). There is the potential for **133.4m ha (high-end potential)** of forests to be under enhanced protection if all assumptions are sustained in the countries assessed to date.

Based on these estimates, between **24 Gt** and **125.3 Gt of CO₂ emissions** may be avoided as a result of FTA contribution to enhanced forest protection.

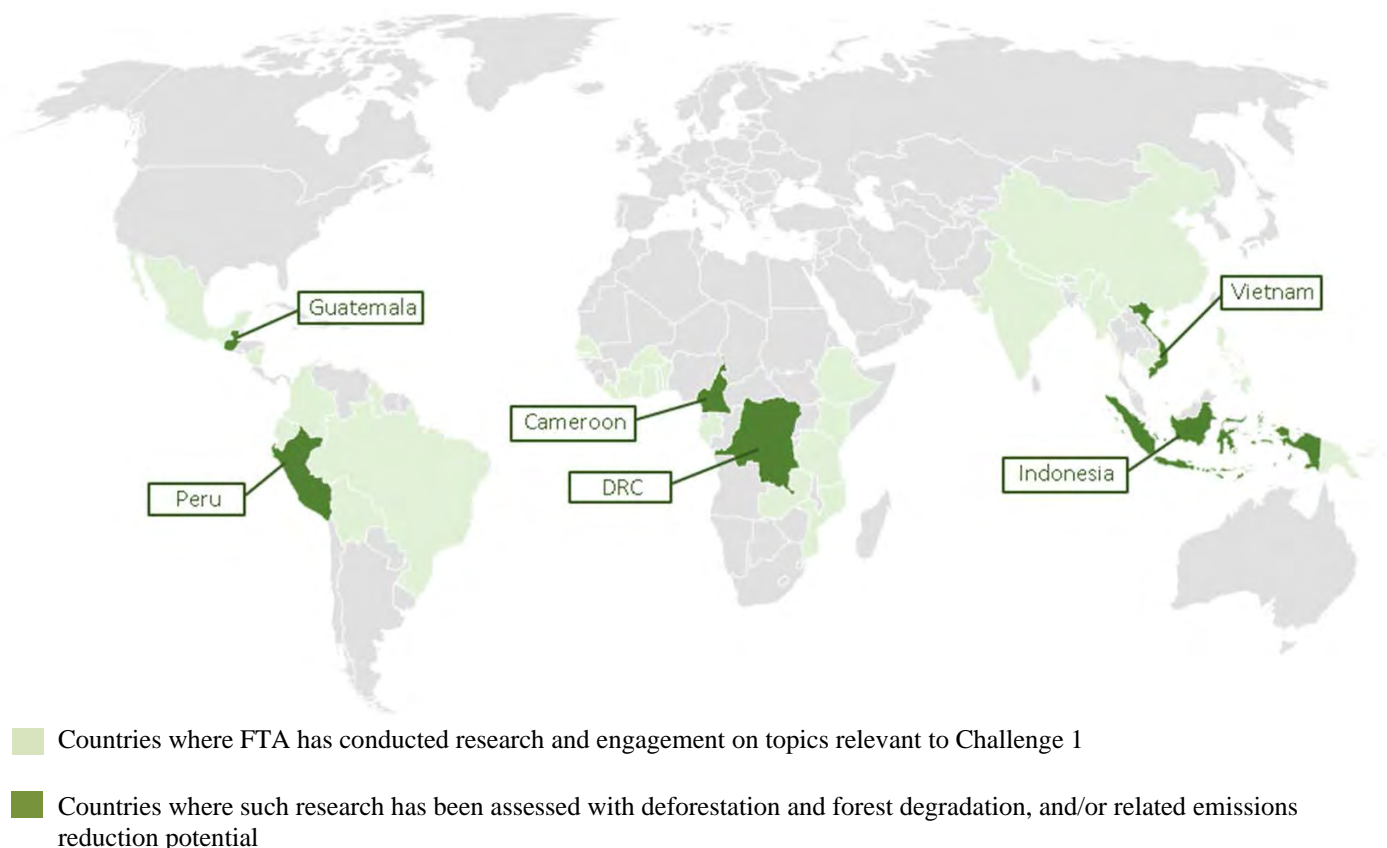


Figure 2: Countries where FTA has carried out research on topics mapped to Challenge 1

Evidence has shown that there is promising progress towards greater influence in hectares of forest under enhanced protection than compared to FTA's original target, which was to better protect 2.5 million ha of forests globally from deforestation and forest degradation²⁵. However, barriers do remain. Through research on the topic, FTA positioned itself as a valued and trusted source of evidence-based recommendations for policy change to support more sustainable use of forests and decrease deforestation, although the realization of expected impacts depend upon perfect implementation and enforcement of such policies which are largely outside of FTA's sphere of control. FTA also engaged and collaborated with a wide range of relevant stakeholders to ensure ownership of research outputs, contribute to capacity-building, and ensure future focus on the topic. Progress towards reduced deforestation and forest degradation in the countries assessed to date rely on collective action by a range of actors including national and international government, NGOs, communities and smallholders, researchers, and the private sector. However, conflicting policy agendas and differing private sector compliance/commitments have resulted in various degrees of impact achieved.

²⁵ Original targets were crafted by the CGIAR system organization in a top-down mode for the whole portfolio, and then distributed to different CRPs, but without a clear quantitative approach and method.

5.3 Assumptions

There are a number of key assumptions underpinning FTA's contribution to reduced deforestation. These assumptions and their potential effect on the realization of future impact are assessed in Table 14.

Table 14: Challenge 1 Assumptions Assessment

Assumption	Assessment
FTA holds a significantly credible position in the academic realm in research for/in development, and is therefore able to exert influence over the way research agendas advance.	Sustained; across multiple geographies, FTA is known as a credible source of information on topics related to deforestation and forest degradation. FTA researchers' positions as experts allowed for greater access to relevant fora to build relationships with stakeholders (e.g., policymakers, partner organizations, NGO advocates, local research institutions, etc.) and share findings, which supported uptake and use of outputs.
The policies to which the research has contributed are effectively implemented and enforced to reach intended targets for reductions in deforestation (i.e., policy changes are sufficient to influence practice and reduce deforestation).	Sustained (dependent on geography and country context); FTA demonstrated varying degrees of successful policy influence targeted at reducing deforestation and forest degradation across cluster geographies. Countries where FTA has been active the longest tend to be where it has the greatest policy influence (e.g., Indonesia). A number of alternative and external factors exert influence within the policy sphere, including political will, global events, market pressures, etc.
NGOs, partners, and organizations with sustainability objectives are actively seeking out evidence to support their campaigns and programs to continue to work with policymakers, communities, and the private sector in efforts to reduce deforestation and reverse forest degradation.	Sustained; across all geographies under Challenge 1, evidence shows that key stakeholders are actively seeking out evidence in an effort to reduce deforestation and forest degradation. FTA contributed to filling knowledge gaps and provided targeted information in accessible formats to ensure uptake and use by a range of stakeholders. Factors such as the increased global focus and pressure also play a role in increasing urgency for evidence-based action.
The public is aware and informed of possible ways to reduce deforestation and forest degradation and is actively campaigning for change at policy, practice and individual levels.	Partially sustained; there was limited evidence on FTA's influence on the public. However, across some clusters, FTA contributed to targeted knowledge-sharing to the public by making outputs publicly accessible (e.g., via blogs and websites) and by promoting FTA knowledge via national media (e.g., Fire and Haze cluster) and NGO campaigns (e.g., Oil Palm cluster). There is limited evidence of active campaigning by the public for policy and practice change across Challenge 1 geographies.
Large companies uphold commitments to zero deforestation as a result of policy and market pressures.	Partially sustained (dependent upon geography); for example, evidence shows commitments in Indonesia by large companies to comply with national policies such as the PIPPIB and international certifications such as RSPO to which FTA contributed. Evidence within the FLEGT cluster suggests that the practice of large companies is expected to eventually change with increased market pressure for legally sourced timber; though current evidence of this outcome is limited and too early to observe.
As smallholders and SMEs gain access to formal markets and tenure via enabling policies that reduce barriers, these groups are better equipped to comply with sustainability requirements.	Partially sustained, (dependent upon geography); current evidence indicates progress for smallholders within Latin America (e.g., AFC Peru, SFM Mesoamerica) and Africa (e.g., SFE in Cameroon), though there is limited evidence in Asia. FTA engaged smallholders and SMEs across various contexts to build understanding, provide opportunities for them to share their voice in policy and decision-making processes, equip them with knowledge and skills, and support tenure processes.
All actor groups that receive training from FTA interventions benefit and obtain new knowledge, skills, and relationships as a result, and are both motivated and capable of leveraging their knowledge and relationships and applying their skills in their work.	Sustained; a key impact pathway within FTA's work on reducing deforestation and forest degradation is the capacity-building of key stakeholders (including researchers, policymakers/decision-makers, smallholders, SMEs, private sector, etc.). By providing new knowledge and training on deforestation, data collection and tracking systems, monitoring and assessment tools, and sustainable forest practices, and providing technical assistance to ensure effective use and application of such knowledge, FTA equipped multiple levels of stakeholders to reduce deforestation and forest degradation. These stakeholders continue to rely on FTA researchers and centres for ongoing support for implementation.

FTA made notable contributions to awareness-raising, policy, and practice change, as well as research over the past ten years in an effort to reduce harmful forestry and agricultural practices that drive global deforestation. FTA's contributions to outcomes have already resulted in realized impacts, and are likely to catalyze further

impacts in the future. However, the realization of impacts relies on conditions including the effective enforcement of revised policies, the full adoption and implementation of new practices, the scaling up of initiatives, and continuity of collective action post-project and post-FTA. While FTA holds a credible position as an independent supplier of scientific knowledge that is useful to inform actions to preserve forests, reduce deforestation, and reverse forest degradation, FTA is one contributor among many organizations that aim to address this complex challenge. Impact estimates are also sensitive to a number of key assumptions that vary on the basis of the research initiative, contextual factors in which the research is taking place (e.g., geography), and specific contributions of the research, including the notion that research outputs are relevant, appropriately translated, adapted to fit the needs of boundary partners, and positioned for use. For example, research projects based in countries in which FTA is well-established, where key scientists have connections to decision-makers, and where decision-makers are interested in and actively looking for evidence-based information and guidance, had a higher likelihood for impact achievement. There are also limits to program influence and a research project can be restricted by resource constraints. This exercise attempted to trace specific program contributions to intended impacts across intervening geographies to specify how and where FTA made a contribution to reduce deforestation in a global context. The relative control and influence of a program declines as it progresses from its intervention (sphere of control) to its impact (sphere of interest) as more contextual and external influences become prevalent.

6 Lessons Learned and Recommendations

6.1 Lessons Learned on Research in Deforestation and Forest Degradation

This exercise provided the opportunity to assess how research on the topic of addressing accelerating rates of deforestation and forest degradation contributed to sustained outcomes and impacts, and highlighted a series of lessons learned. For example, FTA's research identified actors who would benefit directly and indirectly from its engagement activities and research outputs, and encouraged these actors to participate in dialogue and decision-making processes, thereby supporting ownership over outputs and change processes. In a number of projects, FTA was particularly strong in engaging marginalized actors who would not normally have a voice in public policy. FTA positioned itself as a key actor within the topic of deforestation and forest degradation and acted as a knowledge broker, trusted partner, and capacity-builder to contribute to intended outcomes. Valuable insights in what works well have been presented via the main impact pathways highlighted within Challenge 1.

- **Knowledge generation pathway:** Most clusters under Challenge 1 utilized a knowledge generation pathway to contribute to outcomes and impacts. FTA is a research organization; therefore, much of its work focuses on the development of knowledge that can be taken up and used by stakeholders. Developing novel research outputs was a key way in which FTA contributed to change in deforestation and forest degradation globally. FTA also works to build the capacity of researchers, local universities, government research agencies, and international research organizations to advocate for science-based decision-making and advance research on the topic.
 - i. **Developing research capacities through collaborative work and trainings with students and in-country researchers ensured continued work on the topic and built on project data and findings.**
 - ii. **Utilizing multiple targeted dissemination methods by attending national conferences, communicating through blogs, maintaining active participation in multi-stakeholder platforms, and partnering with local universities to raise academic interest helped to spread awareness of FTA findings among academic audiences and encouraged new questions on the topic.** FTA research on deforestation and forest degradation was supported by long-standing relationships between researchers and influential national and international institutions that helped deliver research recommendations to policymakers. Research partnerships strengthened working relationships between FTA and research institutions, and raised FTA's research profile to support increased interest on the topic at research, public, and policy levels.

- iii. **With much deforestation resulting from land use change, particularly to agriculture (e.g., oil palm), future work on combatting deforestation and forest degradation should make links with the agriculture sector, including policy development and implementation.** This could be considered when planning future projects and programs through finding and collaborating with more partners engaged in global agriculture.
- **International and national government pathway:**
 - i. **With frequent government turnover or staff changes in government administrations, knowledge can be lost, particularly when restructuring occurs.** Creating accessible data bases and continuing to prioritize both institutional and individual relationships with government were a few ways in which FTA projects attempted to ensure momentum continues, and collaboration and trust remains.
- **International and national policy pathway:** Contributing to national and international policy is a predominant means in which FTA contributes to impact that reduces deforestation and forest degradation. Many of the other impact pathways intersect with and are influenced by policy change on deforestation and forest degradation.
 - i. **Providing national and international policymakers with knowledge and training through collaborative processes strengthened the capacities of policymakers to implement sustainable change.** For example, engaging policymakers and decision-makers in multi-stakeholder dialogues to identify policy priorities, responsibilities, and implementation methods served to build coalitions, and ensured research outputs were appropriate for use and aligned with government/political concerns. Continuing to support policymakers and providing on-going training also increased the likelihood of policy-change in line with FTA research outputs.
 - ii. **Research projects led by scientists with established positive relationships with policymakers were more likely to contribute to policy outcomes.** Positive pre-existing relationships supported knowledge-sharing and trust in research outputs to support their uptake and use within national policy. Often times, this held true for projects located in countries where the research centre has an office where FTA were viewed as a main source of contextual information to inform deforestation and forest degradation policies. The credibility of FTA's research also contributed to convincing policy makers to integrate research findings into policy and make deforestation and forest degradation issues of higher priority.
 - iii. **Aligning the research with parallel issues supported the uptake of research outputs by policymakers.** For example, providing information that was relevant to current policy processes and timing the research in-line with favourable political climates can leverage policy-windows (Kingdon, 1995). Including a strong outreach component using means that are appropriate and accessible to targeted policy actors most likely to implement change on the identified issue was more likely to drive policy change.
 - iv. **Policy outcomes rely on the continuous promotion and use of outputs by institutions and decision-makers to influence legislations and regulations on deforestation and forest degradation.** This was supported via ongoing institutional and individual relationships with government actors and departments which were stronger in some geographies than in others. Long-term funding of donors provides the required base for the development and maintenance of such continuous relationships.
- **Partner/ally pathway:** Leveraging and strengthening partnerships with a wide range of different organizations and institutions was a key method through which FTA was able to share knowledge and build capacities to support changes in knowledge, attitudes, and skills. For example, increased advocacy

by partners and allies placed pressure on actors such as governments, policymakers, and the private sector to address accelerating rates of deforestation and forest degradation through policy or practice change. Strong and appropriate partnerships also supported the use of FTA research and tools by such actors to make better evidence-based decisions. The realization of high-level outcomes and impacts rest on the assumption that partners continue to advocate for change, therefore future research should continue to support partners and be systematic in how partners are chosen.

- **Private Sector pathway:** Strategically engaging private sector actors and equipping them with knowledge and capacity supported practice change in some contexts. The participation of relevant private sector actors from project inception and their support in the countries of focus ensured that the research targeted priority constraints and issues, and therefore increased the likelihood that results would be used. Training of private sector staff was also a successful means to increase awareness and interest among the private sector in changing their ways of working. As well as through targeted engagement, more widespread sharing of information in media that are appropriate for the private sector ensured outputs were more likely to be accessible and used.
- **Smallholder and community pathway:**
 - i. **Community engagement, participatory activities, and presenting knowledge in ways that are appropriate for the target audience increased the utility of the research process and FTA outputs for smallholders and communities to build understanding and apply in their local context.** Participation in the research process and capacity-building through knowledge sharing was an effective means to empower communities and smallholders to sustainably manage their lands and participate in policy/decision-making discussions. Partnerships with communities and smallholders, and supporting the improvement of available infrastructure, supported the uptake of research outputs and the formalization of recommendations into practice.
 - ii. **Short-term projects experienced more challenges in trust-building and behaviour change amongst forest communities and smallholders.** Evidence shows that trust often takes time beyond the lifespan of a project which can affect the likelihood of smallholder and community uptake of results.
- **Donor/Investor pathway:** Including donors in discussions and decision-making from program start through to completion increased their access to data and their capacity to address deforestation and forest degradation issues through allocating more funding for the topic. In some cases, this helped bring more alignment, continuity, and sustainability to FTA's interventions.
- **Public pathway:** The public pathway was not as prevalent within FTA's research on deforestation and forest degradation topics. However, targeted dissemination through national media and working through NGOs who acted as advocates to garner public attention on deforestation-related issues were effective means to raise public awareness and support in some projects. Increased public awareness on the topic of deforestation and forest degradation exerted pressure on government to develop policy to address related issues.

6.2 Challenges to Overcome and Recommendations for Enhanced MELIA

The assessment of Challenge 1 provides opportunities for FTA and its research centres to consider optimizing monitoring, evaluation, and learning to more strategically align the program to address complex challenges. These challenges include the following:

1. ***Consistencies in monitoring, evaluation, and impact reporting.*** Varying levels of details in project documentation and data presented a challenge for the evaluation team to categorize projects to one or more of the five challenges, as well as identify projects with promising indications of outcomes and impacts. This made the categorization, selection, and assessment processes highly time consuming. Project selection was in part driven by the availability of project documentation, so it is possible that key

FTA research efforts to address accelerating rates of deforestation and forest degradation may have been overlooked or omitted. These inconsistencies are further confounded by the differences between centres' systems and databases. For example, some centres have systematic and robust databases while others are less advanced and developed. In addition, the ways in which project reports and/or evaluations document evidence of outcomes and impacts are inconsistent. This is further reflected into MARLO (the database built for CRPs and where projects are referenced for FTA), which acts a repository but does not impose a specific format for reporting outcomes. Therefore, the investigation teams needed to dig into the project reporting documentation. This difficulty was also particularly apparent in reporting for multi-country projects and programs, where reported evidence is often not disaggregated by study sites, let alone by country. This made the review and analysis of available evidence an arduous task, and introduced difficulties in the testing of ToC logic and misinterpreting or misattributing evidence. Few evaluation reports and/or project documents quantify or estimate impacts in terms of the five challenges or the SLO targets. Often reporting focuses on documenting project activities and outputs, rather than contributions to outcomes, impacts, or other changes in the wider system (results-based reporting).

2. ***Consistencies in the use of monitoring, evaluation, and impact terms.*** There are inconsistent conceptualizations and uses of evaluation terminology across centres and projects. For example, the terms 'output', 'outcome', and 'impact' vary in reporting, which added to the time requirements of the desk review. These keywords could not simply be searched and pulled from reports; the desk review involved much closer reading, review, and translation of content into the appropriate concept categories. Obtaining conceptual clarity of evaluation terminology within the evaluation team was also challenging. Fortunately, prior experience and distinct definitions have been shared and established amongst the team to ensure common understanding and consistent application of these components to support consistency throughout the evaluation.
3. ***Diffusion of topics and geographies of research and engagement signals a lack of coherence in FTA's program strategy to address complex global challenges.*** Building on discussions from the 2020 FTA Science Conference, many of FTA's research projects in fact are Type I²⁶ projects that aim to address Type III 'wicked' problems (i.e., the five challenges)²⁷. While FTA centres, partners, and researchers believe they are doing transdisciplinary research and make such claims in proposals and final reporting, this may not be the case in practice. Siloes often remain or attempts at transdisciplinary approaches fall short – both can be driven by internal or external factors. Moreover, research efforts are diffuse across geographies and topics. These are clearly missed opportunities, as many of the topics and geographies in which FTA operates are closely aligned and overlap in terms of the actors and external processes that FTA engages. Where new projects could leverage pre-existing personal and institutional relationships established by researchers within their own centre, other FTA centres, or FTA partners, too often many begin the process from zero. Overlooking these networks also overlooks the valuable institutional memory of the relationships and engaging in those contexts, which can be a source of valuable learning and efficiency for new research initiatives as well as serve to reinforce and strengthen existing relationships. Moreover, research efforts inconsistently build on one another, affecting FTA's capacities to meaningfully and strategically address complex problems in a given country and/or region. In part, this is a result of

²⁶ Heifetz (1994) categorized problems into three types: Type I problems are situations where the problem is technical and can be solved with technical know-how and skills; Type II problems are situations where the problem is apparent, but the solution is not; Type III problems are situations where there is no obvious definitions of the problem or the solution.

²⁷ All Type III problems can be broken down into several smaller Type I pieces, each tackling one or a few disciplinary foci with targeted and precise research questions. Individually, these pieces cannot address Type III problems, but collectively there may be some overlap with potential to bring the pieces together. This is precisely the role and function of a programmatic approach; to a great extent, such integrative studies are precisely a way by which the program tries to put together a Type III answer to a Type III question. However, more efforts are needed for transdisciplinary research approaches, multi-pronged and multi-dimensional approaches, and integration. One of the outcomes of the integrative studies includes the lessons learned in terms of gaps in the (Type III) ToC that should trigger new research foci and initiatives going forward.

inconsistent and intermittent use of ToC across centres and projects, and an artefact of the diffusion and lack of coherence inherent to responding to bilateral donor demands. Effective, centrally-coordinated information management systems are critical to facilitate integration and coherence. Often the strengths that the ToC tool can provide for more strategic interventions (e.g., building shared understanding, negotiation, communication, consensus-building, adaptive project management, etc.) are not leveraged, and in many cases some impact pathways are likely to hold up and demonstrate greater potential than others. Effective integration mechanisms are required to ensure that research programs aiming to address complex Type III problems reach their full potential for influence within the scope of short-term project cycles. Therefore, research-for-development programs need to clearly and explicitly link strategies and goals at both project and program scales.

4. ***Setting targets for projects helps ground intended influence and impact, and makes researchers build impact into project design.*** Many of FTA's projects did not set or document impact targets (e.g., proposal stage, end-of-project reporting stage), making the evaluation and estimation of FTA's impacts on deforestation immensely difficult for the evaluators. One reason that might explain this is that projects' MELIA activities were often designed to fulfill proposal or final reporting requests from the respective project donor; some donors require projects to set targets and report against them, while others do not. It can be daunting for researchers to lay claim their potential impact at the proposal stage (particularly when funding and other resources remain unclear), only to be held accountable to original (possibly overly ambitious) targets at project-end. More explicit documentation of impact targets, particularly as part of the ToC, requires researchers to be more realistic with the targets they set and also more intentional in how they design and implement projects to reach those targets.

Based on the identified challenges described above, the evaluation team formulated diverse recommendations to enhance MELIA, which can strengthen the design, monitoring, learning, and agile managing, as well as reporting and final evaluation of future FTA projects and across the research centres.

1. ***Use of nested ToCs can support challenge-centric program and strategy design, including identifying targets for research projects and programs.*** Researchers and program managers should fully utilize ToC as a core element of strategic project planning and adaptive management. How FTA aims to contribute to complex social problems should guide program strategy, design, and implementation. A robust ToC for the challenges that FTA aims to address would be a useful tool to guide strategic program management, and align centre and partner efforts in overlapping geographies and research topics to maximize intended contributions to outcomes, impacts, and SLO targets. Collaboratively developing ToCs for research projects would also provide the opportunity to collect outcome and impact data throughout the research process as part of adaptive management and monitoring to support the setting and reaching targets. Target-setting encourages researchers to aspire for big impact through their research projects, but also guides them to set reasonable and feasible impact targets. More explicit target-setting and documentation makes it easier for researchers, project coordinators and managers, and MELIA to attract funding and report progress back to donors. Project-level impact targets should also align with program-level targets for impact and be reported on consistently in projects' midterm and final reports. For example, projects which set impact and outcome targets from inception, such as 'Learning from REDD: A Global Comparative Analysis' (which also utilized a ToC), were more successful at meeting such targets and realizing impacts on-the-ground compared to projects which did not set targets. ToC can also support and highlight opportunities for investment in long-term partnerships that continue to sustain themselves across projects, a key factor that contributed to successful policy change in projects mapped to Challenge 1. Future research-for-development programs should be guided by the value offer of purpose-driven central coordination for impact, which can be informed by explicit and well-developed ToC.
2. ***Aim for consistent documentation of projects and influence across centres.*** To the extent possible, targeted intended outcomes and impacts (i.e., beyond activity and output level) for the specific challenges that FTA aims to address should be quantified and reported on project level (both in project design and final reporting), and program-level targets should be derived from these documents. Specific outputs of

interventions should clearly link to intended outcomes and impacts. A transparent monitoring and evaluation process is recommended from start to finish of research programs using evidence collection tools and engaging researchers and key stakeholders from inception. Theory-based evaluation offers the opportunity for both summative and formative assessment, and can facilitate both continuous learning and accountability to intended outcomes. Considering the increasing need to establish well-functioning, results-based monitoring and reporting systems for documenting and presenting achieved results to donors in a credible way, this evaluation method is recommended for future research to support consistent MELIA data management across research centres. To this end, it is recommended that the centres' project managers seek support from the respective monitoring and evaluation teams from the very beginning (project design/proposal phase); in joint research programs like CRP FTA, these monitoring and evaluation teams should liaise with each other to ensure that documentation procedures are consistent across centres. Facilitating systematic collection of MELIA data along the entire project lifespan enhances the accuracy and comprehensiveness of measured results compared to an ex-post assessment, and is considered to be significantly more cost-efficient. Yet, the resource constraints and the lack of a well-developed database management system that could support more comprehensive and cost-efficient MELIA activities are recognised by the evaluation team at both the centre and FTA level. Acknowledging the administrative resource requirements for research teams to document progress not only on activity and output level, but also towards intermediate and higher-level outcomes, research centres are recommended to both provide supporting MELIA teams and recurrently consider and invest in further possibilities to support the centres' research teams. An identified bottleneck and common theme in this assessment exercise was the need for the development of a consistent MELIA database system at the centre-level, the establishment of associated workflow systems, and a common digital platform which support research teams to easily feed results on outcomes and impacts into these systems. It is also recommended to collect disaggregated MELIA data on gender and youth promotion in projects where appropriate, in order to satisfy donors' information interest in the centres' performance in these fields (in some projects, this data was not collected, though the evaluator team assumes this would have been possible and promising).

3. ***Strive for consistency in the application of monitoring and evaluation concepts.*** We suggest the following definitions for terminology be adopted by FTA and across centres, and recommend enhanced capacity-building for FTA researchers on these definitions and the use and implementation of these concepts:
 - a. **Outputs:** The products, goods, and services of the research and the research process (i.e., knowledge, fora, and processes generated by the activities).
 - b. **Outcomes:** Changes in knowledge, attitudes, skills, and relationships manifested as changes in behaviour.
 - c. **Impacts:** Changes in flow (e.g., higher annual income, increased water discharge from a river) or state (e.g., socio-economic status, water quality in a reservoir), resulting wholly or in part from a chain of events to which the research has contributed.” (Belcher, Davel, & Claus, 2020, p.9)

References

- Aenor. (2020). Verification Report: Indonesia – Norway Verification of reduced emissions from deforestation and forest degradation. Retrieved from <https://www.regjeringen.no/en/aktuelt/noreg-betalen-530-millionar-for-redusert-avskoging-i-indonesia/id2722135/>
- Amalia, R., Dharmawan, A. D., Prasetyo, L. B., & Pacheco, P. (2019). Perubahan tutupan lahan akibat ekspansi perkebunan kelapa sawit: dampak sosial, ekonomi, dan ekologi. *Jurnal Ilmu Lingkungan*, 17: 130-139.
- Belcher, B. M., Davel, R., & Claus, R. (2020). A refined method for theory-based evaluation of the societal impacts of research. *MethodsX*, 7: 100788.
- Bennett, K. (2010). Additionality: The next steps for ecosystem service markets. *Duke Environmental Law & Policy Forum*, 20: 417-438.
- Earl, S., Carden, F., & Smutylo, T. (2001). *Outcome mapping: Building learning and reflection into development programs*. Ottawa, Canada: International Development Research Centre.
- FAO. (2020). Global Forest Resources Assessment 2020, terms and definitions FRA 2020. FAO, Rome.
- FAO. (2020). The State of Food Security and Nutrition in the World: Transforming Food Systems for Affordable Healthy Diets. Retrieved from <http://www.fao.org/3/ca9692en/CA9692EN.pdf>
- FTA. (2016). FTA Revised Phase II Full Proposal (2017-2022). Retrieved from: <https://tinyurl.com/48k8eu44>
- Flores, N. L. (2016). Impact Assessment of Natural Resource Management Policy Research: A case study of the contribution of the Sustainable Wetlands Adaptation and Mitigation Project to the effectiveness of the Indonesian Forest Moratorium (Masters thesis, Virginia Polytechnic Institute and State University, USA). Retrieved from <https://vtechworks.lib.vt.edu/handle/10919/71894>
- Global Forest Watch. (2021). Global Deforestation Dashboard. Retrieved from <https://tinyurl.com/hn57954k>
- Government of the Kingdom of Norway & Government of the Republic of Indonesia. (2010). Letter of Intent on Cooperation on reducing greenhouse gas emissions from deforestation and forest degradation. Retrieved from https://www.regjeringen.no/globalassets/upload/smk/vedlegg/2010/indonesia_avtale.pdf
- Heifetz, R.A. (1994). *Leadership without easy answers*. Cambridge, MA: The Belknap Press of Harvard University.
- Heilmayr, R., Carlson, K. M., Benedict, & J. J. (2020). Deforestation spillovers from oil palm sustainability certification. *Environmental Research Letters*, 15: 075002.
- Hidayat, N. K., Offermans, A., & Glasbergen, P. (2018). Sustainable palm oil as a public responsibility? On the governance capacity of Indonesian Standard for Sustainable Palm Oil (ISPO). *Agriculture and Human Values*, 35: 223–242. <https://doi.org/10.1007/s10460-017-9816-6>
- International Tropical Peatlands Centre. (2021). About Us. Retrieved from <https://www.tropicalpeatlands.org/about-us/>
- Jakarta Post Up Close. (2021). Declining rate of deforestation: is it the new normal? [Webinar]. Retrieved from <https://www.youtube.com/watch?v=XDKVyi6LicI>
- Karsenty, A., Aubert, S., Brimont, L., Dutilly, C., Desbureaux, S., Ezzine de Blas, D., & Le Velly, G. (2017). The economic and legal sides of additionality in payments for environmental services. *Environmental Policy and Governance*, 27(5): 422-435. <https://doi.org/10.1002/eet.1770>
- KHLK (2020). The State of Indonesia's Forests. Retrieved from <https://kemlu.go.id/oslo/en/news/10525/e-book-the-state-of-indonesias-forests-2020>
- Kingdon, J. W. (1995). *Agendas, Alternatives and Public Policies* (2nd ed.). New York: Harper Collins College.
- Kissinger, G., Herold, M., & De Sy, V. (2012). Drivers of deforestation and forest degradation: A synthesis report for REDD+ policymakers. Retrieved from

https://www.researchgate.net/publication/283069190_Drivers_of_deforestation_and_forest_degradation_A_synthesis_report_for_REDD_policymakers

Koh L. P., & Wilcove, D. S. (2007). Cashing in palm oil for conservation. *Nature*, 448: 993–994.

Mongabay. (2021). Deforestation in Indonesia hits record low, but experts fear a rebound. Retrieved from <https://news.mongabay.com/2021/03/2021-deforestation-in-indonesia-hits-record-low-but-experts-fear-a-rebound/>

Murdiyarso, D., Dewi, S., Lawrence, D., & Seymour, F. (2011). Indonesia's forest moratorium: A stepping stone to better forest governance?. Retrieved from https://www.cifor.org/publications/pdf_files/WPapers/WP-76Murdiyarso.pdf

Murdiyarso, D., Van Noordwijk, M., Wasrin, U. R., Tomich, T. P., & Gillison, A. N. (2002). Environmental benefits and sustainable land-use options in the Jambi transect, Sumatra. *Journal of Vegetation Science*, 13: 429-438.

Nguyen, H., Thuy, D., & Hoang, N. (2020). Payment For Environmental Service: An Application in Tourism in Vietnam. <https://doi.org/10.22225/seas.4.1.1691.77-87>

Pham, T. T., Bui, N., Đào, L. C., Hoang, L., Pham, H. L., & Nguyen, V. D. (2018). The role of Payment for Forest Environmental Services (PFES) in financing the forestry sector in Vietnam. <https://doi.org/10.17528/cifor/006958>.

Pham, T. T., Bennet, K., Vu, T. P., Brunner, J., Le, N. D., & Nguyen, D. T. (2013). Payments for forest environmental services in Vietnam: From policy to practice. Retrieved from <https://www.cifor.org/knowledge/publication/4247>

Pham, T. T., Chau, N. H., Chi, D. T. L., Long, H. T., & Fisher, M. R. (2020). The politics of numbers and additionality governing the national Payment for Forest Environmental Services scheme in Vietnam: A case study from Son La province. *Forest and Society*, 4(2): 379-404. <https://doi.org/10.24259/fs.v4i2.10891>

Statista (2021) Size of oil palm plantations Indonesia 2010-2019 - Total land area of oil palm plantations in Indonesia from 2010 to 2019. Retrieved from: <https://www.statista.com/statistics/971424/total-area-of-oil-palm-plantations-indonesia/>

UNFCCC. (2011, November 28—December 11). Report of the Conference of the Parties (UNFCCC/CP/2011/9/Add.2) [Conference proceedings]. 17th Session of the Conference of the Parties, Durban, South Africa. Retrieved from <https://unfccc.int/resource/docs/2011/cop17/eng/09a02.pdf>

Vogel, C., Moser, S. C., Kasperson, R. E., & Dalbelko, G. D. (2007). Linking vulnerability, adaptation, and resilience science to practice: Pathways, players, and partnerships. *Global Environmental Change*, 17: 349-364.

Young, J., & Bird, N., (2015). Informing REDD+ policy: An assessment of CIFOR's Global Comparative Study. Overseas Development Institute, London.

Appendix 1. Cluster-level ToCs and Explanations: Challenge 1 (Deforestation and Forest Degradation)

Cluster: REDD+ Policy Mechanism (Global)

<i>Project</i>	<i>Centre</i>	<i>Duration</i>	<i>Budget</i>	<i>Countries</i>
Learning from REDD: A Global Comparative Analysis (Phase 1 of GCS REDD+ Program)	CIFOR	2010-2013	USD 10,194,000	Indonesia, Viet Nam, Nepal, Brazil, Peru, Bolivia, DRC, Tanzania, Cameroon
Learning from REDD+: An Enhanced Global Comparative Analysis (Phase 2 of GCS REDD+ Program)	CIFOR	2013-2015	USD 10,238,910	Cameroon, Tanzania, Indonesia, Viet Nam, Brazil, Peru
REDD: Research to Support Design and Implementation	CIFOR	2012-2015	USD 9,899,000	Indonesia, Viet Nam, Papua New Guinea, Nepal, Tanzania, Burkina Faso, Mozambique, Cameroon, Peru, Brazil, Bolivia
Opportunities and Challenges to Developing REDD+ Benefit Sharing Mechanisms in Developing Countries	CIFOR	2012-2016	USD 6,566,500	Brazil, Cameroon, Indonesia, Peru, Tanzania, Viet Nam
A Global Comparative Study for Achieving Effective, Efficient and Equitable REDD+ Results (Phase 3 of GCS REDD+ Program)	CIFOR	2016-2020	USD 10,752,688	Brazil, Indonesia, Peru, Ethiopia, Guyana, Myanmar, DRC, Viet Nam
From Climate Research to Action under Multilevel Governance: Building Knowledge and Capacity at Landscape Scale (MLG)	CIFOR	2014-2018	USD 4,979,230.15	Indonesia, Mexico, Peru, Viet Nam
Reducing emissions from deforestation and degradation through alternative land-uses in rainforests of the tropics (REDD-ALERT)	CIFOR, ICRAF	2009-2012	€600,000	Cameroon, Peru, Viet Nam
Impacts of Reducing Emissions from Deforestation and Forest Degradation and Enhancing Carbon Stocks (IREDD+)	CIFOR, ICRAF	2015-?	€1,171,544.80	China, Indonesia, Viet Nam
SECURED Landscapes: Sustaining Ecosystem and Carbon benefits by Unlocking Reversal of Emissions Drivers in Landscapes	ICRAF	2013-2015	NOK 10,000,000	Cameroon, DRC, Indonesia, Peru, Viet Nam

Purpose: Effective implementation of REDD+ to reduce deforestation-driven climate change

In addition to international and national climate change policy mechanisms (REDD+), reliable data are needed to support effective policy mechanism implementation to address the negative effects of deforestation-driven climate change. FTA has undertaken a broad range of research projects on REDD+ culminating in global comparative studies. FTA played a role in facilitating learning platforms for REDD to achieve the 3Es (Effective, Efficient, Equitable), tested stepwise approaches to estimate reference emission levels, quantified emissions, and conducted multiple policy impact studies at the country level, assessing private corporate initiatives, exploring incentives and trade-offs for benefit sharing mechanisms, and developing improved monitoring, measurement, reporting, and verification (MMRV) systems. FTA research framed REDD+ policy opportunities and gaps, particularly for MMRV to raise the profile of REDD+ governance and carbon management, and generated data quantifying carbon emissions and forest and carbon reference levels. In addition, the research proposed recommendations for global and national REDD+ policies, measures, and commitments, developed training and supports for the REDD+ learning community, as well as provided guidance for the implementation and monitoring of REDD+ policies. As a result of these contributions, multi-level governments were expected to develop and implement more effective and informed REDD+ policies, partners and allies would support policy implementation at various levels and play an active role in the monitoring of government and private sector REDD+ commitments to hold these actors accountable to their commitments. As a result, the private sector was expected to respond to policy and civil society demand to adhere to REDD+ policies, and change their practices to reduce deforestation-related emissions. Researchers were also expected to build capacities and advance research on REDD+, which would continue to feed into REDD+ policy development and implementation. Ultimately, it was expected that REDD+ will better fill its mandate to reduce deforestation-related emissions through enhanced forest management at the national and international level.

Potential impact from the cluster:

Hectares of forest under enhanced protection; high-end potential: 114.6 million

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

Estimated amount of CO₂ emissions (Gigatons); high-end potential: 107.7 Gt

Hectares of forest under enhanced protection; low-end estimate: 12.3 million

Estimated amount of CO₂ emissions (Gigatons); low-end estimate: 11.5 Gt

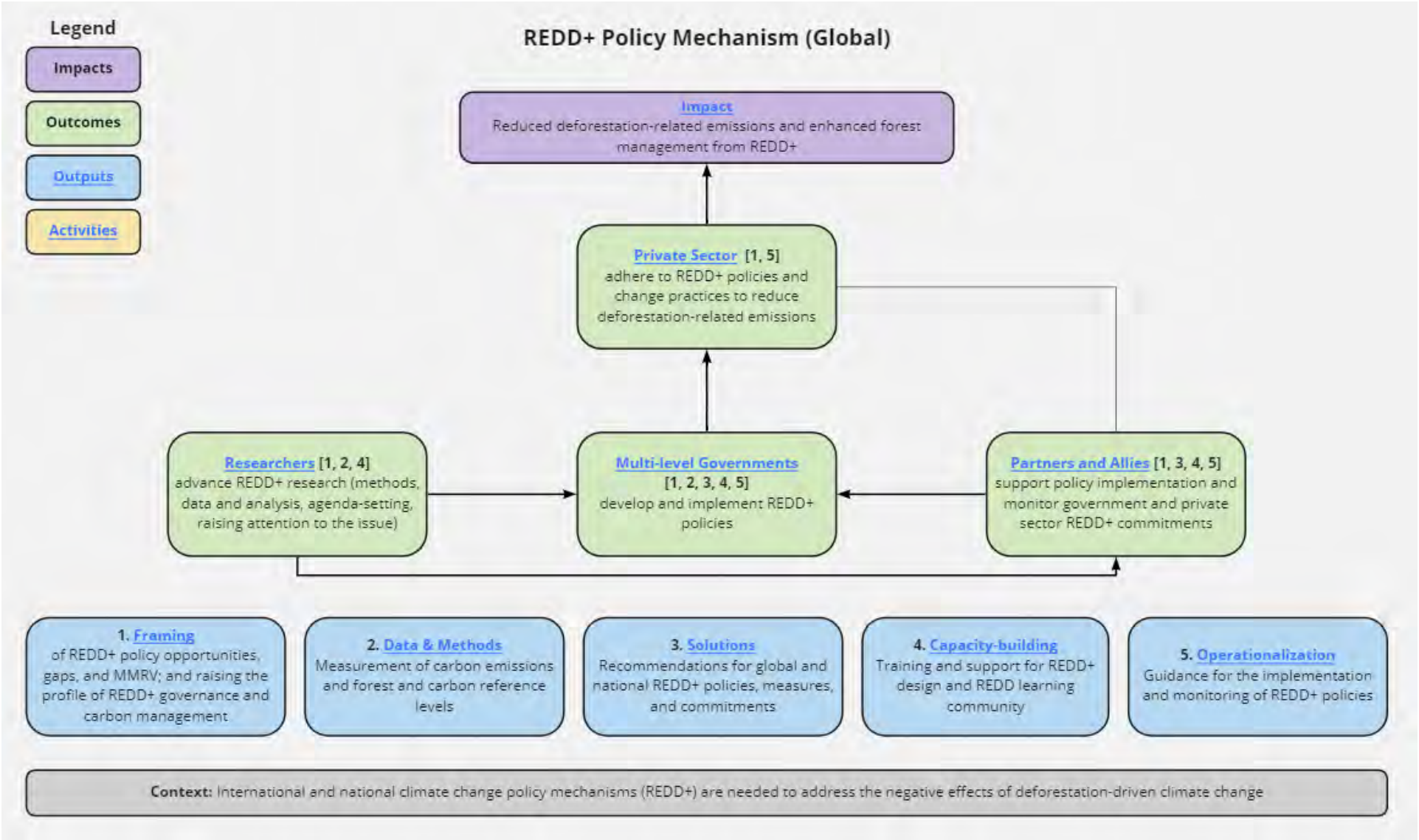


Figure 3: Cluster-level sub-ToC for FTA research on REDD+

Cluster: Wetlands (Global)

<i>Project</i>	<i>Centre</i>	<i>Duration</i>	<i>Budget</i>	<i>Countries</i>
Sustainable Wetlands Adaptation and Mitigation Programme (SWAMP)	CIFOR	2011-2014	USD >2,000,000	Liberia, Senegal, Gabon, Mozambique, Tanzania, Mexico, Peru, Colombia, Ecuador, Indonesia, India, Cambodia, Philippines, Papua New Guinea
Characterizing and Assessing Palm Swamp Degradation in the Peruvian Amazon	CIFOR	2020-2020?	USD 104,500	Peru
Sustainable Wetlands Adaptation and Mitigation Program (SWAMP): Phase 2	CIFOR	2016-2018	USD 1,414,274	Kenya, Cameroon, India, Indonesia, Viet Nam, Brazil, Colombia, Ecuador, Mexico, Peru
Sustainable Wetlands Adaptation and Mitigation Program (SWAMP) 2019	CIFOR	2018-2019	USD 835,726	Tanzania, Kenya, Indonesia, Viet Nam, Peru, Mozambique, Gabon, Cameroon
Mainstreaming Wetlands into the Climate Agenda: A multi-level approach (SWAMP-II)	CIFOR	2019-2020	USD 750,000	Not available

Purpose: Effective management of wetlands and peatlands to reduce negative impacts of climate change

Inadequate data to effectively monitor wetlands limits the recognition of their ecological value, and makes wetlands and peatlands vulnerable to deforestation as a result of aquaculture expansion and other development. FTA has primarily undertaken biophysical research to characterize and assess swamp degradation at the national level by estimating carbon emissions from vegetation changes, developed tools and models for ecosystem carbon dynamics suitable to tropical forest wetlands worldwide, and offered training opportunities to develop capacity with resource managers and policymakers. One aim of FTA research is to frame wetlands as a priority for climate action and raise the profile of wetland issues. FTA research has also supplied data to quantify the loss and degradation of wetlands and associated emissions, as well as build capacities of resource management, scientific, and policy communities to deal with wetland carbon issues. Moreover, FTA developed tools to support quantification activities, and provided guidance and data for the IPCC and national-level REDD+ management. As a result of these contributions, it was expected that national policymakers worldwide would have the information and tools necessary to develop and implement policies to sustain wetlands as part of their climate mitigation strategies and international policymakers would commit to the wetland agenda. Through multi-stakeholder opportunities facilitated by FTA, partners and allies would promote such policies, and researchers would continue to advance research on wetlands around the world. The private sector was expected to comply with new policy provisions and reduce stress on wetlands. Should these outcomes be realized, it is expected that wetlands and peatlands would become sustainably managed and preserved in the interest of addressing the causes and effects of climate change.

Potential impact from the cluster:

Hectares of forest under enhanced protection; high-end potential: 14.3 million

Estimated amount of CO₂ emissions (Gigatons); high-end potential: 13.4 Gt

Hectares of forest under enhanced protection; low-end estimate: 11.2 million

Estimated amount of CO₂ emissions (Gigatons); low-end estimate: 10.5 Gt

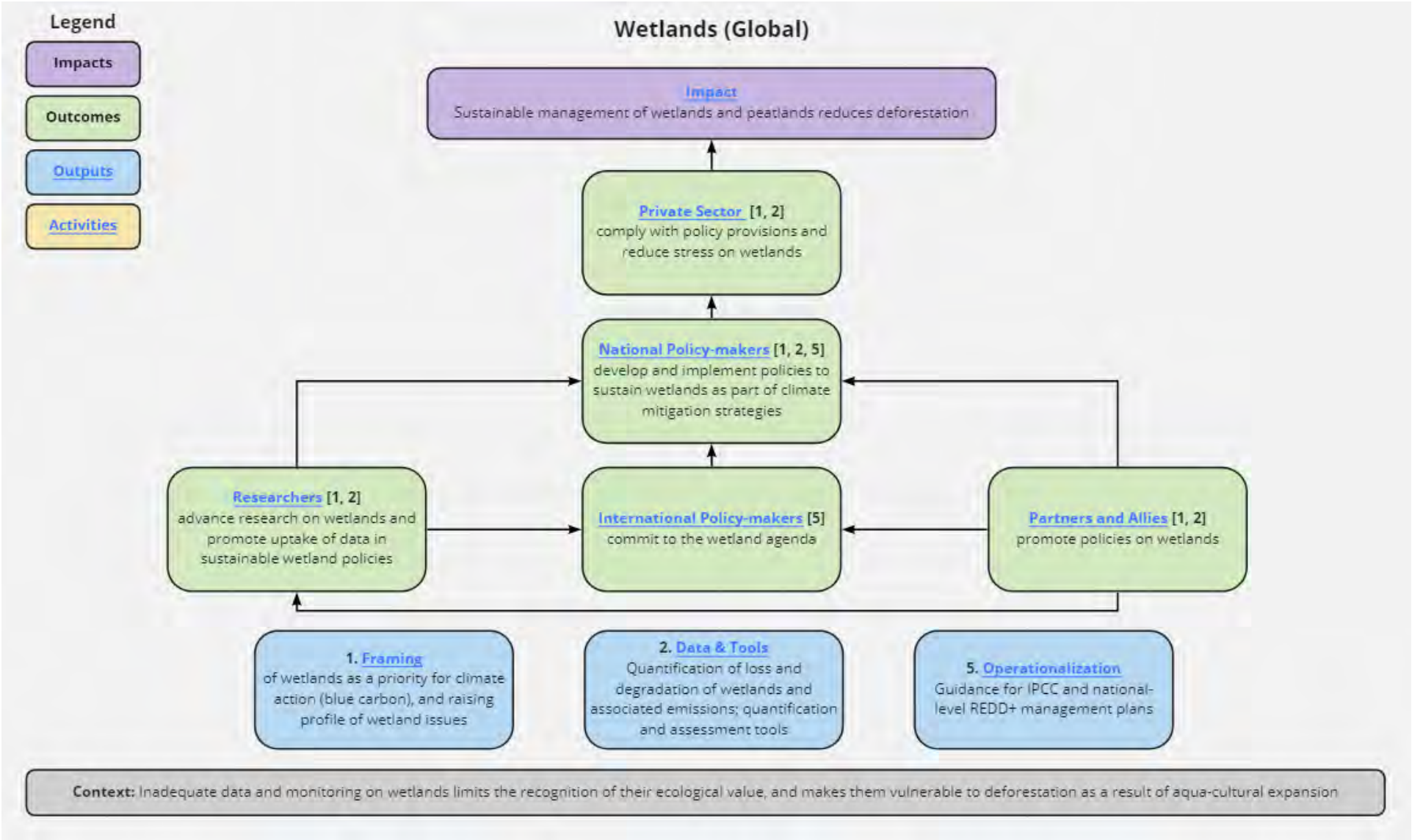


Figure 4: Cluster-level sub-ToC for FTA research on Wetlands

Cluster: Fire and Haze in Indonesia

<i>Project</i>	<i>Centre</i>	<i>Duration</i>	<i>Budget</i>	<i>Countries</i>
Improving the way knowledge on forests and climate is used and understood internationally (Political Economy Study of Fire and Haze in Indonesia)	CIFOR	2015-2015	USD 281,722	Indonesia
DFID Know-for 2: Political economy of fire and haze	CIFOR	2015-2017	USD 413,249	Indonesia
Disaster Preparedness Specific Discipline Integrated Programme in Riau, Indonesia	CIFOR	2018-2020	USD 307,685	Indonesia

Purpose: Reduced instances of fire in Indonesia and corresponding forest loss

Advocacy, policy, and practice in support of fire prevention are needed to reduce forest loss from anthropogenic and natural forest fires. FTA research investigated the social, ecological, and economic dimensions of fires in Indonesia with the intent to inform policy and practice. FTA's research contributed by framing fire issues (there are political and economic incentives to burn), concepts to address issues (fire prevention), and raising the profile of fire-related issues. FTA generated data on the causes and locations of fires, as well as overlapping land claims. The research proposed solutions including recommendations for fire prevention policy and practice that consider context, as well as guidance and input to fire prevention policy development processes at the national and regional levels. FTA also established multi-stakeholder fora for fire prevention in Riau. As a result of these contributions, it was expected that the public would gain awareness of the importance of forest and land fire prevention and demand action. Public demand, in combination with FTA's contributions to policy, would help inform governments' development and implementation of regulations on fire prevention. NGO allies would advocate for fire prevention as a result of accurate and reliable data, and researchers would advance research on fire and haze. The resulting pressure from policy and the public would influence the private sector to commit to the fire prevention agenda and ultimately lead to farmers no longer using fire in agricultural practices, reducing instances of fire in Indonesia and corresponding forest loss.

Potential impact from the cluster:

Hectares of forest under enhanced protection; high-end potential: 2.4 million

Estimated amount of CO₂ emissions (Gigatons); high-end potential: 2.3 Gt

Hectares of forest under enhanced protection; low-end estimate: 11.1 ha

Estimated amount of CO₂ emissions (Gigatons); low-end estimate: 9x10⁻⁶ Gt

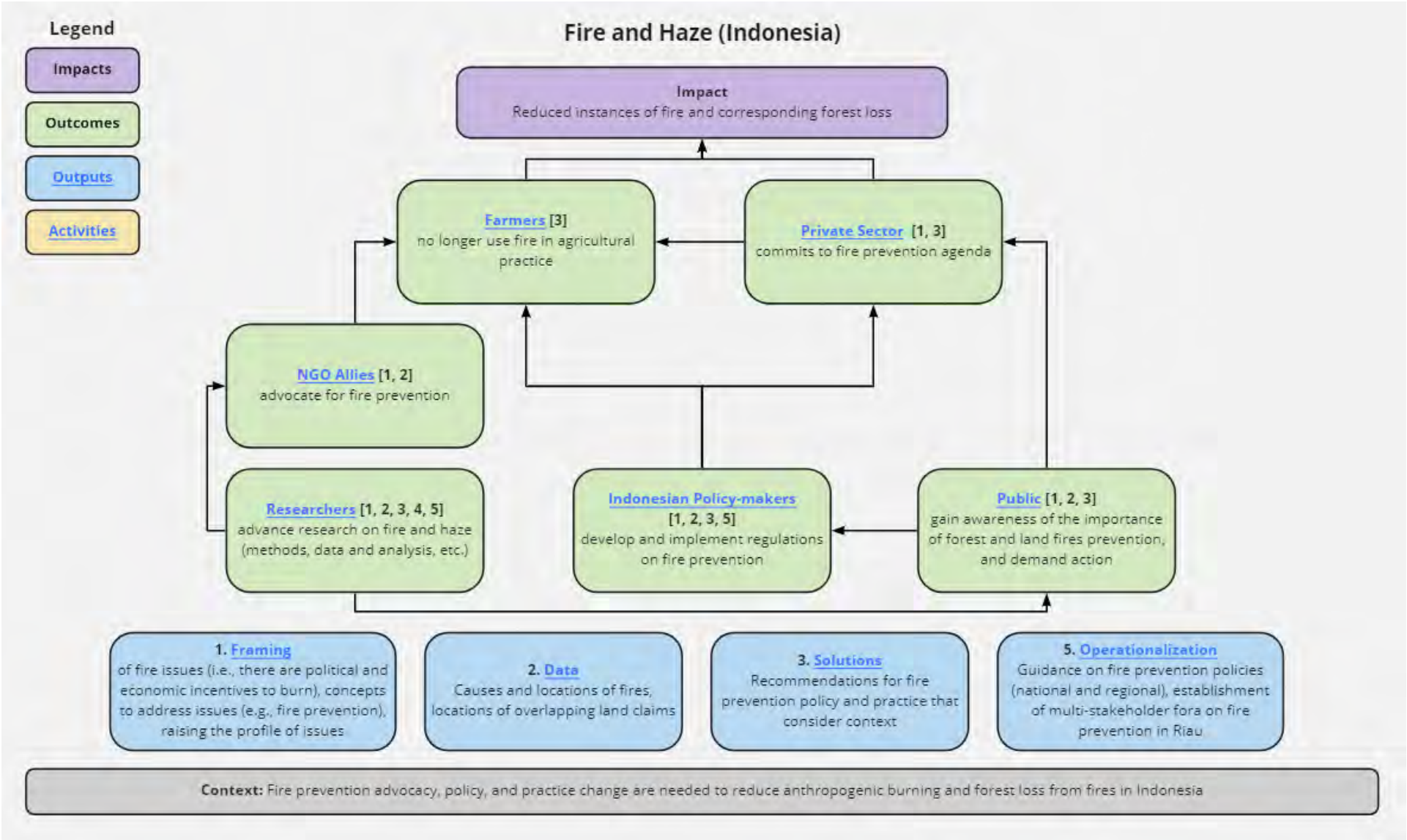


Figure 5: Cluster-level sub-ToC for FTA research on Fire and Haze in Indonesia

Cluster: Agroforestry Concessions in Peru (Figure 6)

<i>Project</i>	<i>Centre</i>	<i>Duration</i>	<i>Budget</i>	<i>Countries</i>
Support to the Development of Agroforestry Concessions in Peru (SUCCESS)	ICRAF	2016-2017	€125,000	Peru
PARA: Piloting approaches to rural advisory services in support of scaling of the Agroforestry Concessions scheme in Peru	ICRAF	2019-2022	1,343,930 ²⁸	Peru
Peru's Agroforestry Concessions Scheme: Collaborative Action to secure Multi-level Readiness for Implementation of an Innovative, Transformative Policy Project	ICRAF	2020-2023	3,260,000 ²⁹	Peru

Purpose: Sustainable multi-use management through agroforestry systems

Informal farming communities' expansion of the agricultural frontier is a driver of deforestation in the Peruvian Amazon. FTA research aimed to support the implementation of agroforestry concessions for eligible smallholders in Peru that would lead to the reduction of deforestation. FTA works with and engages governments, NGOs, and local communities to frame challenges and opportunities for the agroforestry concession mechanism (e.g., compliance barriers for eligible smallholders), as well as expanded definitions of smallholders and concepts of smallholder heterogeneity. FTA's research also quantified the potential GHG reduction impact of successful implementation of the mechanism and mapped eligible zones and areas and proposed a new approach for zoning. Along with capacity and training for researchers and communities, FTA research co-produced guidance to implement and operationalize the agroforestry mechanism and its technical guidelines. As a result of these interventions, it is expected that the government at the national and sub-national levels would revise existing policy and effectively implement the mechanism, and NGOs support these processes to ensure smallholders can benefit from and comply with the mechanism's requirements. As a result, eligible smallholders would be incentivized to apply for and be awarded a concession, develop and maintain their capacities to comply with the provisions of the concession, and adopt agroforestry practices. It is expected that the culmination of these outcomes would reduce the amount of forest cut down to expand agricultural areas for cocoa and coffee and support some reforestation in the Peruvian Amazon.

Potential impact from the cluster:

Hectares of forest under enhanced protection; high-end potential: 450,000ha

Estimated amount of CO₂ emissions (Gigatons); high-end potential: 0.4 Gt

Hectares of forest under enhanced protection; low-end estimate: 183.56

Estimated amount of CO₂ emissions (Gigatons); low-end estimate: 17.4x10⁻⁴Gt

²⁸ Currency currently not retrievable from documentation

²⁹ Currency currently not retrievable from documentation

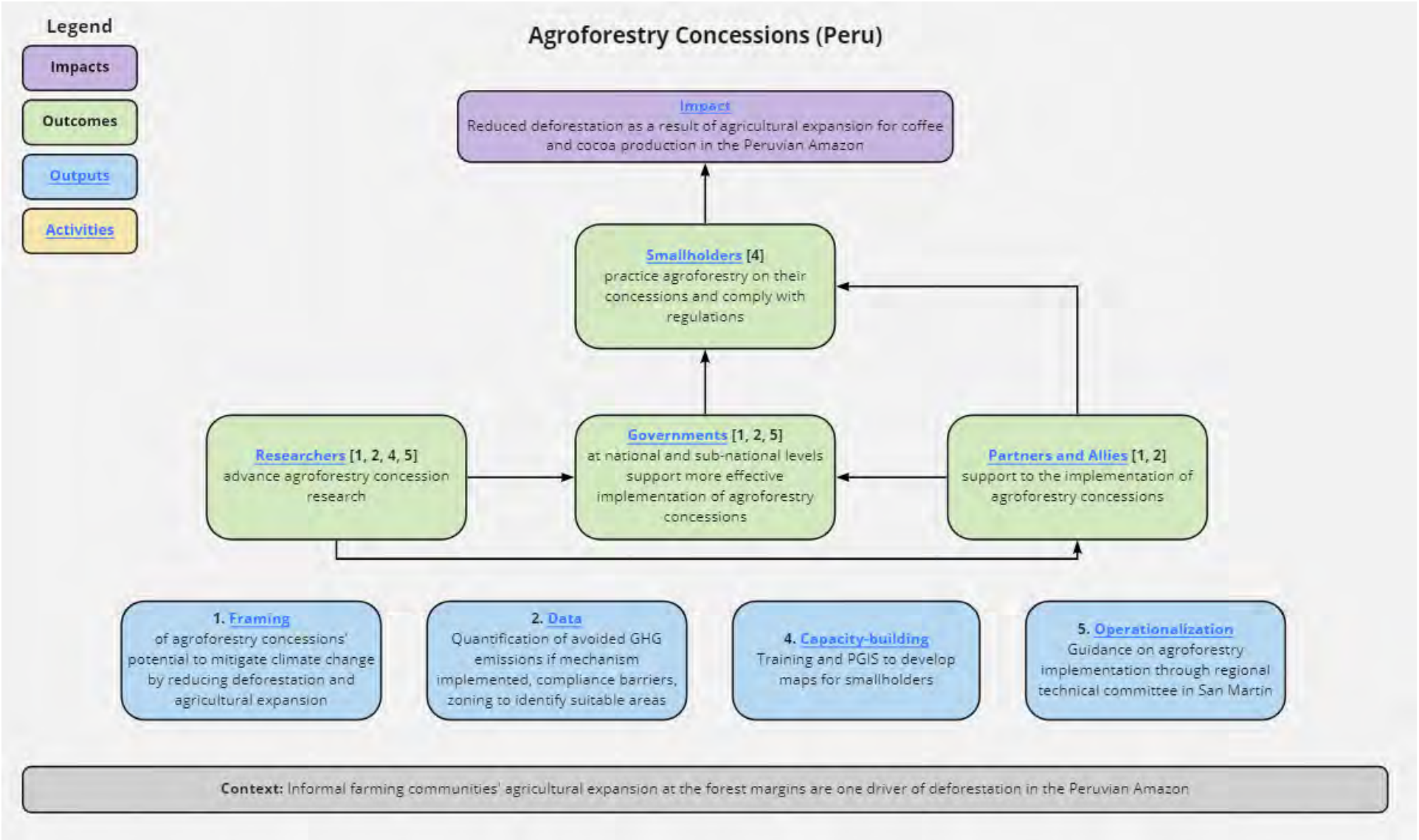


Figure 6: Cluster-level sub-ToC for FTA research on Agroforestry Concessions in Peru

Cluster: Sustainable Forest Management in Mesoamerica

<i>Project</i>	<i>Centre</i>	<i>Duration</i>	<i>Budget</i>	<i>Countries</i>
Forestry to enhance livelihoods and sustain forests in Mesoamerica: How institutional arrangements and value chains affect benefits and resources	Biodiversity International	2013-2017	USD 643,150	Guatemala, Nicaragua

Purpose: Enhancing conservation of forest resources in Mesoamerica (Guatemala and Nicaragua)

Sustainable forest management is one of the prominent foci of FTA's research. In Mesoamerica where pressures are needed from policy and the market to encourage community-based forest management, FTA's research facilitated participatory germination pilots with communities, investigated governance arrangements and socio-economic benefits of community forestry in different community contexts, and explored the socio-cultural realities, barriers, and opportunities of community forestry for communities. The research produced recommendations for policy development, policy implementation, and the management of community forests targeted to governments, local forestry cooperatives, NGOs, and communities. Based on these interactions, governments in Guatemala and Nicaragua were expected to develop and implement policy to support sustainable community forest management. Local cooperatives and NGOs were expected to support policy processes as well as communities' adoption of more sustainable forest-based practices and community forest management strategies. By influencing these actors, FTA aimed to contribute to the enhanced conservation of forest resources and communities' socio-economic well-being in Mesoamerica.

Potential impact from the cluster:

Hectares of forest under enhanced protection; high-end potential: 350,000ha

Estimated amount of CO₂ emissions (Gigatons); high-end potential: 0.3 Gt

Hectares of forest under enhanced protection; low-end estimate: 55,597

Estimated amount of CO₂ emissions (Gigatons); low-end estimate: 0.05 Gt

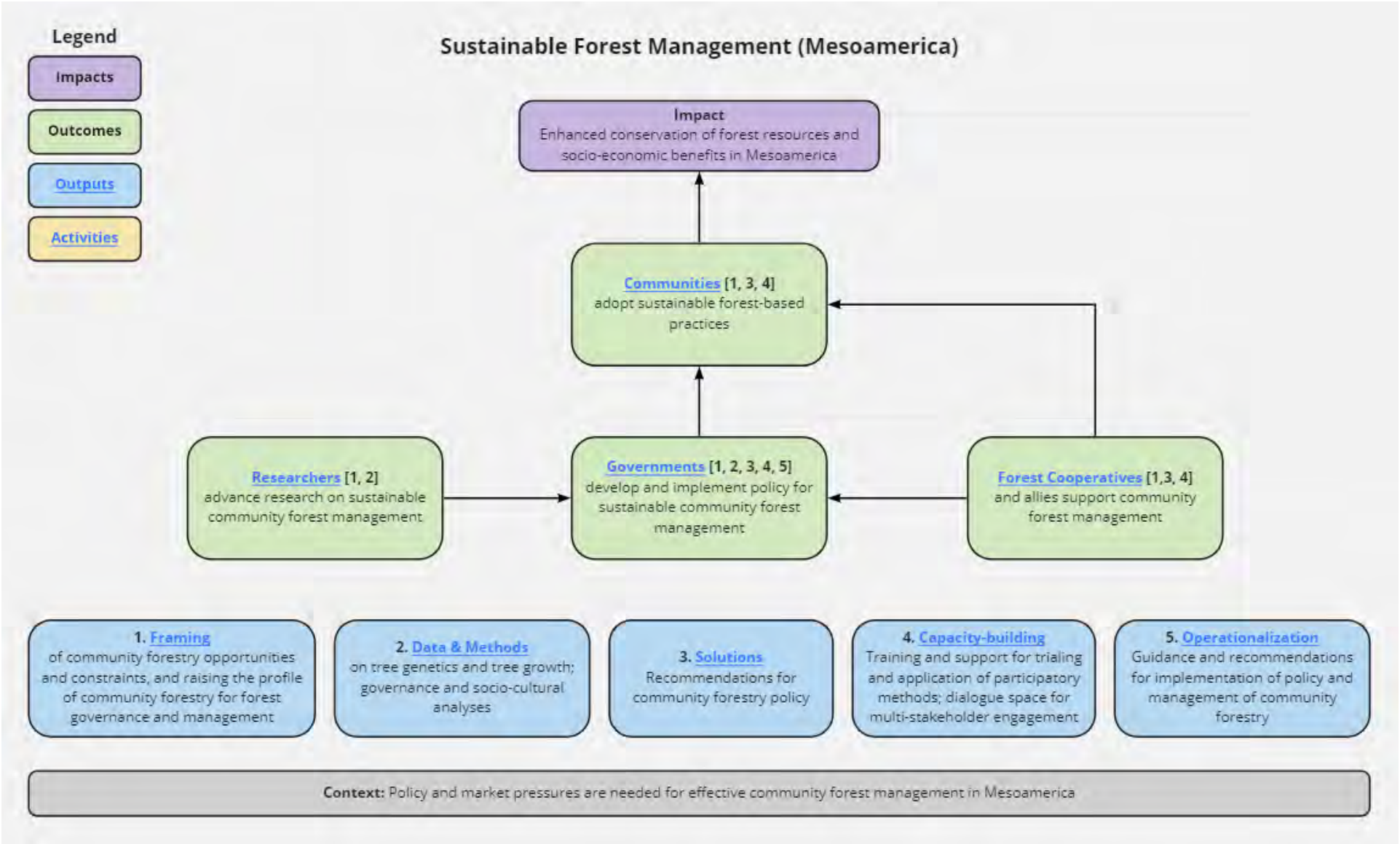


Figure 7: Cluster-level sub-ToC for FTA research on Sustainable Forest Management in Mesoamerica

Cluster: Sustainable Forest Enterprises in Cameroon

<i>Project</i>	<i>Centre</i>	<i>Duration</i>	<i>Budget</i>	<i>Countries</i>
DRYAD: Improving Livelihoods and Land Use in Congo Basin Forests - Financing Sustainable Community Forest Enterprises in Cameroon	ICRAF	2015-2020	USD 8,941,462	Cameroon

Purpose: Enhance viable community forest enterprises (CFE) for sustainable forest management in Cameroon

Community forests have been unable to attract and access finance in Cameroon owing to underlying risks and poor capacity issues. Therefore, capacity-building, technical assistance, and financial investment are needed to equip viable community forest enterprises (CFEs) to support environmental, social, and livelihood objectives. Improved monitoring capacities are needed for community forests in Cameroon to improve management. FTA's research activities ranged from delivering financing and monitoring systems for community enterprise performance against select environmental, social, and economic indicators, facilitating capacity-building and technical, business, and governance training to local communities and implementing organizations, policy engagement, and investigating the effectiveness and efficiency of the financial mechanism. FTA research framed the potential of CFEs to contribute to economic, social, and environmental development, facilitated the development of a real-time field monitoring system to enable CFEs to collect data and monitor forest use and CFE performance, produced performance-based finance models, lessons, and recommendations for policy and scaling up the approach, and published resources and guidance for CFE implementation. As a result of FTA's activities and uptake of outputs, it was expected that implementing organizations would be equipped to identify viable business plans, support CFE implementation through monitoring and technical advisory services, and hold communities to account. Governments were expected to create and facilitate a more enabling environment for CFEs through a better understanding of CFE barriers, formally recognize CFEs as social enterprises, as well as increase opportunities for community-governmental engagement and community participation in policy discourse. Public and private investors were expected to make investment decisions using evidence-based performance data and invest more in performance-based CFE models. Communities were expected to build capacities to sustainably manage and maintain community forest land and monitor CFE performance, establish a community of practice, and reinvest profits into community development. With successful outcomes and demonstrable return-on-investment, it was expected that other communities and regions would scale up the performance-based finance approach for CFEs. As CFEs improve their forest management practices, the instances of illegal logging and encroachment in community forests would be reduced, leading to an overall reduction in deforestation in Cameroon.

Potential impact from the cluster:

Hectares of forest under enhanced protection; high-end potential: 1.3 million

Estimated amount of CO₂ emissions (Gigatons); high-end potential: 1.2 Gt

Hectares of forest under enhanced protection; low-end estimate: 85,250

Estimated amount of CO₂ emissions (Gigatons); low-end estimate: 0.08 Gt

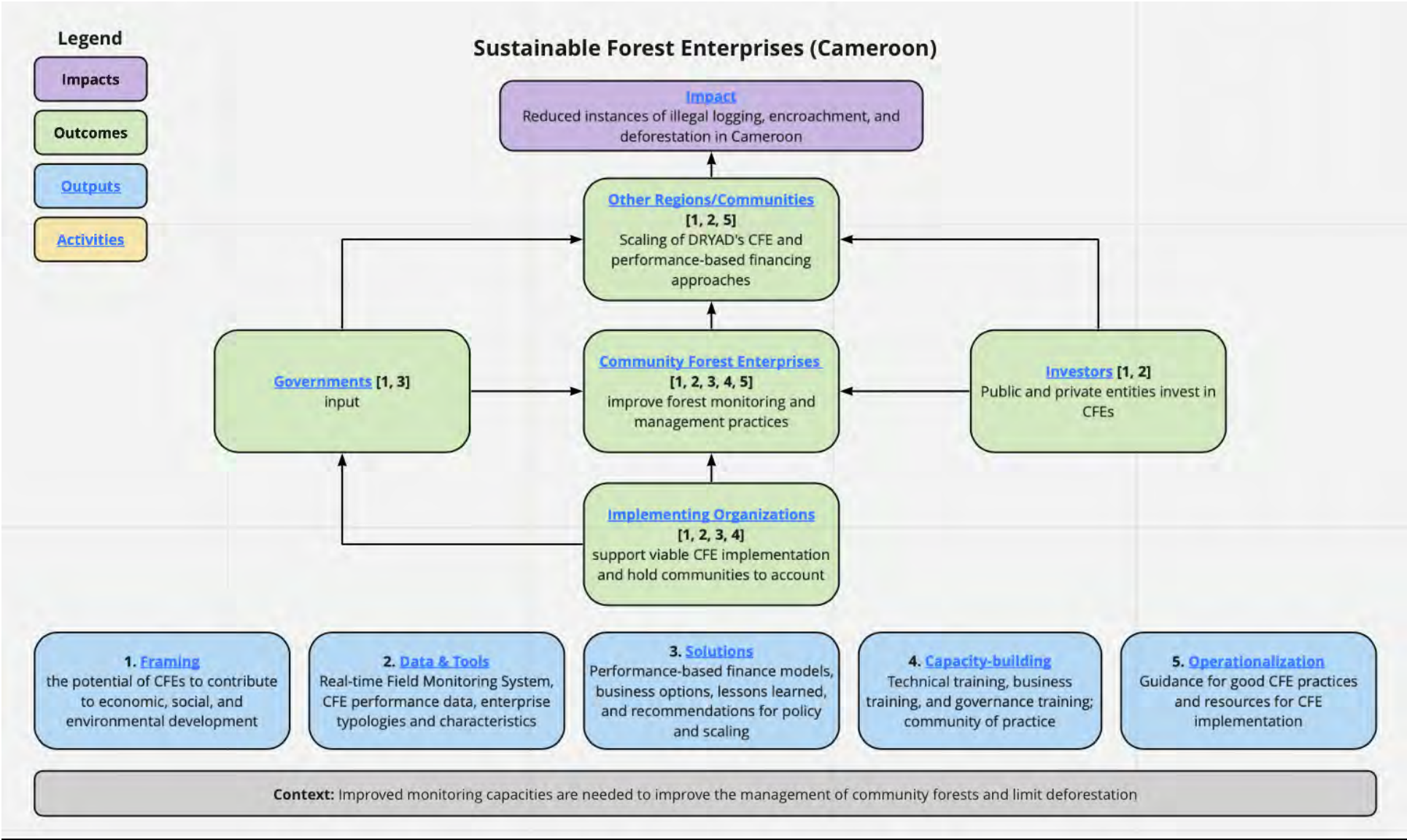


Figure 8: Cluster-level sub-ToC for FTA research on Sustainable Forest Enterprises in Cameroon

Cluster: Oil Palm in Indonesia

<i>Project</i>	<i>Centre</i>	<i>Duration</i>	<i>Budget</i>	<i>Countries</i>
Supporting local regulations for sustainable oil palm in East Kalimantan	CIFOR	2015-2017	USD 105,000	Indonesia (East Kalimantan)
Governing Oil Palm Landscapes for Sustainability (GOLS)	CIFOR	2015-2019	USD 2,490,485	Indonesia (Central and West Kalimantan)
Oil Palm Adaptive Landscapes (OPAL)	CIFOR	2015-2021	CHF 2,999,829	Indonesia, Colombia, Cameroon
DFID Know-for 2: Corporate Commitments to Sustainability	CIFOR	2015-2017	USD 658,040	Indonesia, Brazil, Mozambique
DFID Know-for 2: Food Security Strategy	CIFOR	2016-2017	USD 636,011	Burkina Faso, Cameroon, Ethiopia, Indonesia, Uganda, Zambia

Purpose: Sustainable and inclusive oil palm production in Indonesia

Policy and market pressures are needed to change unsustainable oil palm production causing deforestation in Indonesia. FTA's research on oil palm in Indonesia ranges from analyses of the biophysical aspects of oil palm expansion, spatial analyses to quantify and qualify expansion and future scenarios, and policy-relevant analyses of private sector and government commitments to improve sustainability and inclusion in the sector. With new framing of oil palm issues, new data and analyses including maps and visualization tools, solutions and recommendations for improved policy and practice, researchers and governmental capacity development, and guidance for policy development and implementation, there would be a greater foundation of knowledge and national capacity on which to advance oil palm research and policy toward sustainability. Research partners and allies with similar sustainability objectives would have reliable resources to further advocate for and pursue pressing oil palm issues. For example, NGOs would have more evidence on which to build their campaigns. Increased market pressure from NGO campaigns and increased consumer awareness are expected to influence policy and practice. As a result of engagements throughout the research process and access to the research, the Indonesian government will be better equipped and incentivized to develop and implement sustainable oil palm policy, and likewise RSPO would revise their standards to better reflect sustainability and inclusion. These policy changes are expected to influence the practice of oil palm companies to adopt more sustainable and inclusive business models. As a result of better policy and improved practice across the private sector, smallholders are expected to adopt better agricultural practices and be better able to comply with sustainability standards. With improved practices by companies and smallholders, as well as better governance and management of forests, Indonesia's oil palm sector is expected to reduce oil palm expansion driven deforestation.

Potential impact from the cluster:

Hectares of forest under enhanced protection; high-end potential: No evidence found in available project documentation

Estimated amount of CO₂ emissions (Gigatons); high-end potential: Not assessable, as no evidence on high-end potential found in available project documentation

Hectares of forest under enhanced protection; low-end estimate: 2 million

Estimated amount of CO₂ emissions (Gigatons); low-end estimate: 1.9 Gt

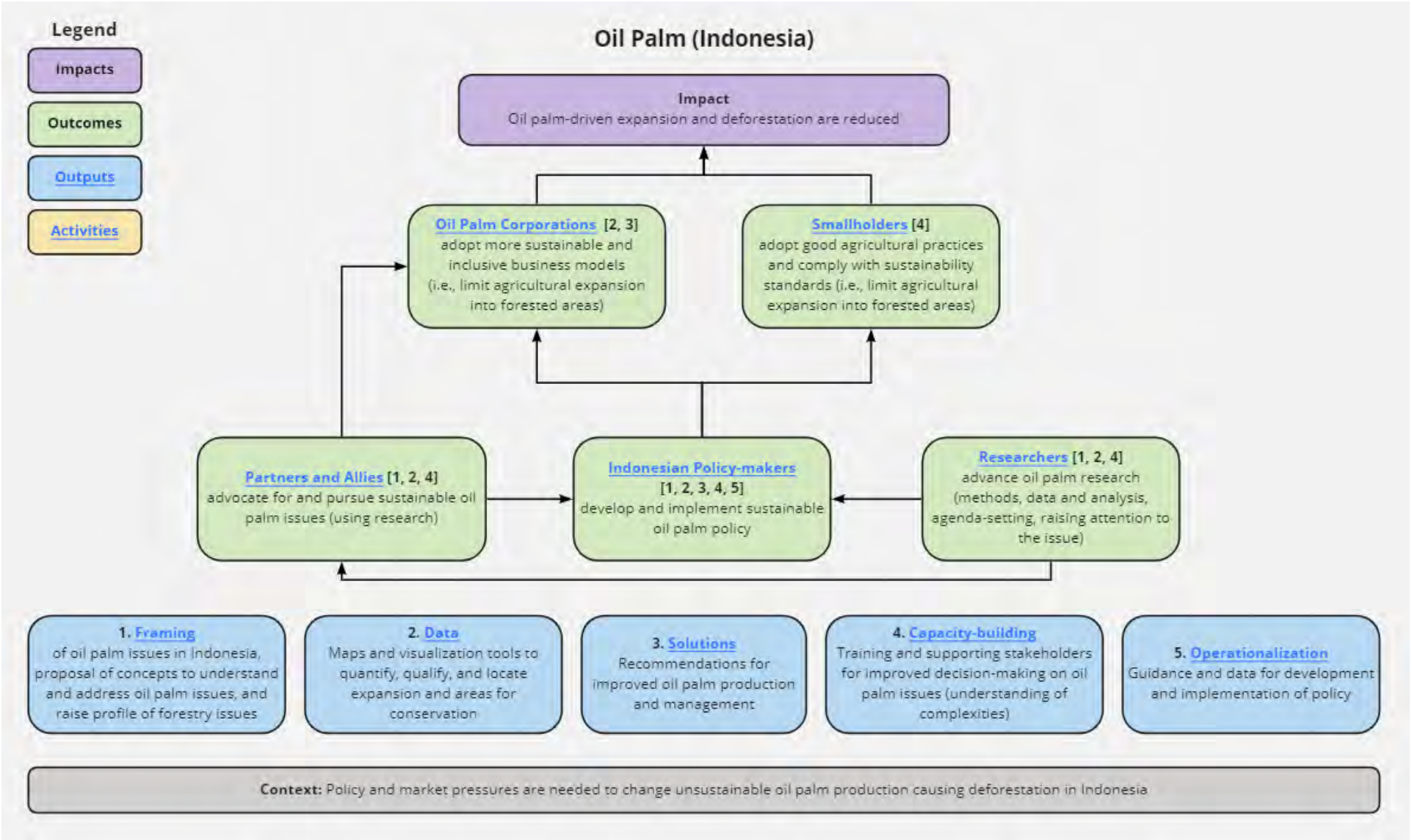


Figure 9: Cluster-level sub-ToC for FTA research on Oil Palm in Indonesia

Cluster: Sustainable Forest Management in the Congo Basin

<i>Project</i>	<i>Centre</i>	<i>Duration</i>	<i>Budget</i>	<i>Countries</i>
REFORCO (Appui à la politique Nationale de conservation et gestion des forêts et de la biodiversité en République démocratique du Congo)	CIFOR	2009-2016	USD 7,817,199	DRC
Forests and Climate Change in Congo (FCCC)	CIFOR, ICRAF	2013-2016	USD 7,800,094	DRC
Yangambi, pôle scientifique au service de l'homme et des forêts (YPS)	CIFOR	2017-2020	USD 3,557,700	DRC
Nouveaux Paysages du Congo	CIFOR	2019-2022	USD 5,600,000	DRC
Aide à l'application des normes FSC sur la régénération et la diversité génétique des essences du bassin du Congo (COMIFAC)	Bioversity International	2015-2017	24,640 ³⁰	Cameroon
Beyond Timber: Reconciling the Needs of Logging Industry with those of Forest-dependent People (AFDB)	Bioversity International	2011-2014	1,726,044 ³¹	Cameroon, DRC, Gabon

Purpose: Sustainable forest management in the Congo Basin

For sustainable forest management in the Congo Basin, policy and market pressures as well as viable agroforestry options are needed to reduce deforestation across the region. Most of FTA's work on sustainable forest management has focused on the Congo Basin. This research has ranged from forest planting, capacity-building and training, the regeneration potential of tree species, the socio-cultural importance of indigenous species and current threats, value chains and market access, among others. The research produced knowledge on the effects of human pressures on forest resources such as logging and community use, the viability of intensified agroforestry systems, models, guidelines, and recommendations for mutually beneficial forest management practices for communities and the private sector. FTA also created opportunities for multi-stakeholder engagements and discussion on sustainable forest management in the Congo Basin. Based on these interactions and research activities, governments were expected to develop and implement policies to support sustainable forest management at the national, sub-national, and local levels, garner support from NGOs to lobby governments and companies to support sustainable forest management, stimulate timber companies to design and implement sustainable forest management plans, and influence community practices to alleviate agricultural pressures on forests. These changes were intended to reduce the deforestation and degradation of rural forests in the Congo Basin.

Potential impact from the cluster:

Hectares of forest under enhanced protection; high-end potential: No evidence found in available project documentation

Estimated amount of CO₂ emissions (Gigatons); high-end potential: Not assessable, as no evidence on high-end potential found in available project documentation

Hectares of forest under enhanced protection; low-end estimate: No evidence found in available project documentation

Hectares of forest under enhanced protection; low-end estimate: Not assessable, as no evidence on low-end estimate found in available project documentation

³⁰ Currency currently not retrievable from documentation

³¹ Currency currently not retrievable from documentation

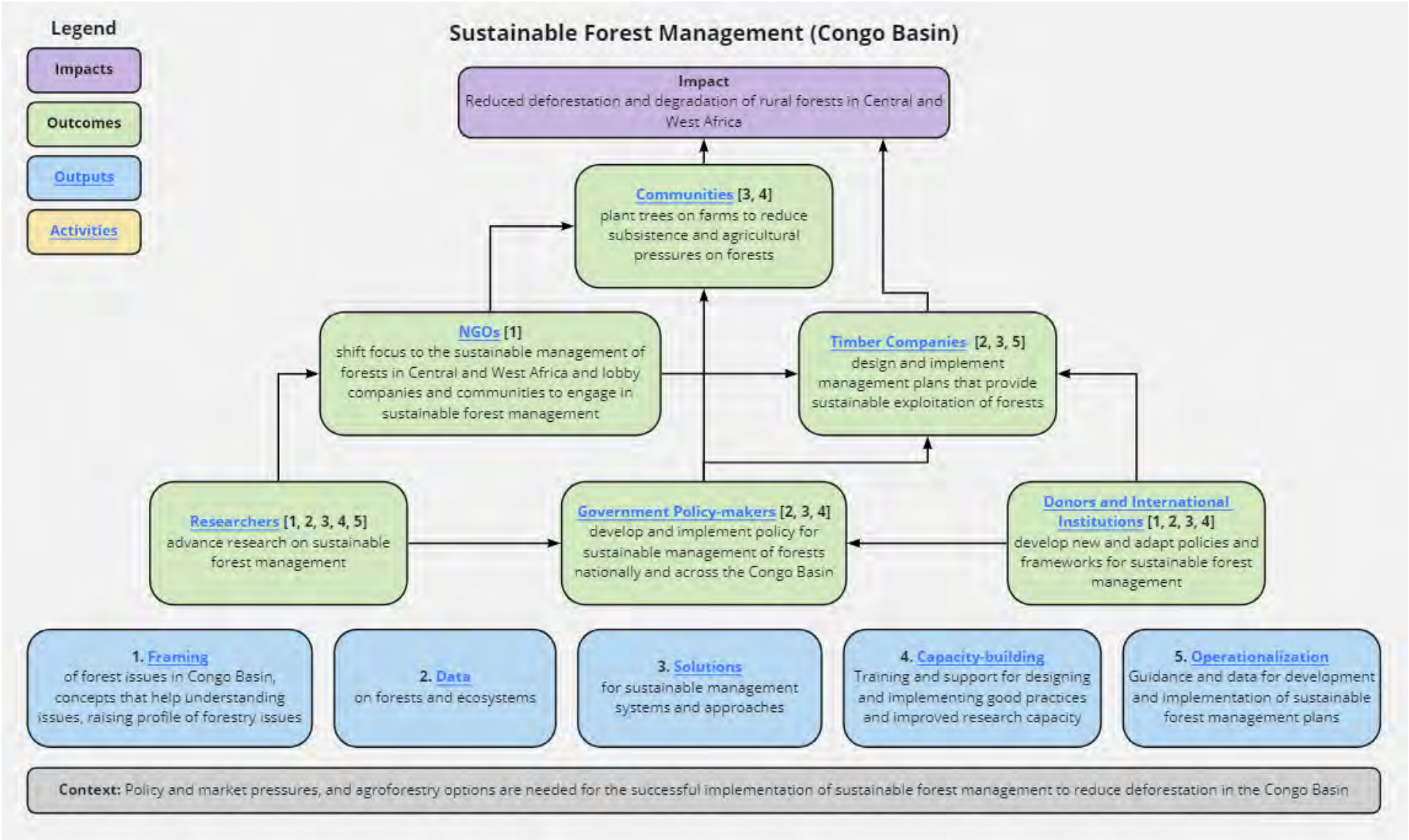


Figure 10: Cluster-level sub-ToC for FTA research on Sustainable Forest Management in the Congo Basin

Cluster: FLEGT Mechanism for Illegal Logging (Global)

<i>Project</i>	<i>Centre</i>	<i>Duration</i>	<i>Budget</i>	<i>Countries</i>
Appui technique au Ministère des Forêts et de la Faune pour l'opérationnalisation de la page web et la collecte de données dans le cadre de la mise en œuvre de l'Annexe VII de l'APV/FLEGT	CIFOR	2015-2016	USD 27,048	Cameroon
Collecting evidence of FLEGT VPA-impacts for improved FLEGT communication	CIFOR	2019-2019	USD 459,896	Ghana, Cameroon, Indonesia
Realisation d'une etude de caracterisation des differents types d'offres et de demandes en bois et produits derives dans Jes marches publics en Cote d'Ivoire	CIFOR	2018-2019	USD 53,590	Cote D'Ivoire
Essor des demandes publiques et privees camerounaises en sciages d'origine legale	CIFOR	2017-2019	USD 109,947	Cameroon
PRO-FORMAL: Policy and regulatory options to recognise and better integrate the domestic timber sector in tropical countries	CIFOR	2010-2013	EUR 3,750,000	Cameroon, Gabon, Ecuador, Indonesia, DRC
Governing Multifunctional Landscapes (GLM) in Sub-Saharan Africa: Managing Trade-Offs between Social and Ecological Impacts	CIFOR ICRAF	2017-2021	USD 11,074,500	Cameroon, Ghana, DRC, Gabon, Zambia, Kenya
Developing DNA timber tracking tools and a conservation strategy for African mahogany (<i>Khaya senegalensis</i>) in West Africa	Bioversity International	2014-2016	186,500 ³²	Benin, Burkina Faso, Ghana, Togo

Purpose: Effective implementation of FLEGT to reduce instances of illegal logging (Global)

Policy pressure and market transparency are needed to implement and incentivize FLEGT compliance to decrease instances of illegal logging. FTA's research ranged from botanical and genetic sampling of African tree species, policy analyses of the FLEGT mechanism and its communication strategy, assessments of value chain dynamics and regional priorities, and surveyed timber buyers, among other activities. FTA engaged diverse government stakeholders and experts within the forest sector and implemented territorial approaches to support inclusive local community decision-making processes. The research framed FLEGT/VPA opportunities and gaps, provided species origin and reference data, methods and DNA tools for species identification, information for companies using legal wood, and wood-fuel trade flow maps and value chain analyses. The research also proposed solutions to encourage consumer demand for legal timber as well as policy options for domestic timber markets and conservation strategies. The research established multi-stakeholder platforms to discuss issues or draft policy, offered training and technical capacity development, and supported graduate students. As a result of these contributions, it was expected that policymakers across Africa, Asia, and Latin American would create new or adapt existing policy on the legal procurement of timber and gain improved monitoring capacities. NGOs and CSO partners would support the implementation of and private sector compliance with these policies. Timber companies were expected to comply with FLEGT, and smallholders and SMEs were expected to have increased incentives and capacities to comply with legal requirements. Researchers were expected to build on the foundation to advance research on FLEGT and timber markets. These outcomes were expected to contribute to the broader impact of successful implementation of FLEGT, and therefore reductions in illegal logging and deforestation in West and Central Africa.

Potential impact from the cluster:

Hectares of forest under enhanced protection; high-end potential: No evidence found in available project documentation

Estimated amount of CO₂ emissions (Gigatons); high-end potential: Not assessable, as no evidence on high-end potential found in available project documentation

Hectares of forest under enhanced protection; low-end estimate: No evidence found in available project documentation

Estimated amount of CO₂ emissions (Gigatons); low-end estimate: Not assessable, as no evidence on low-end estimate found in available project documentation

³² Currency not retrievable from documentation

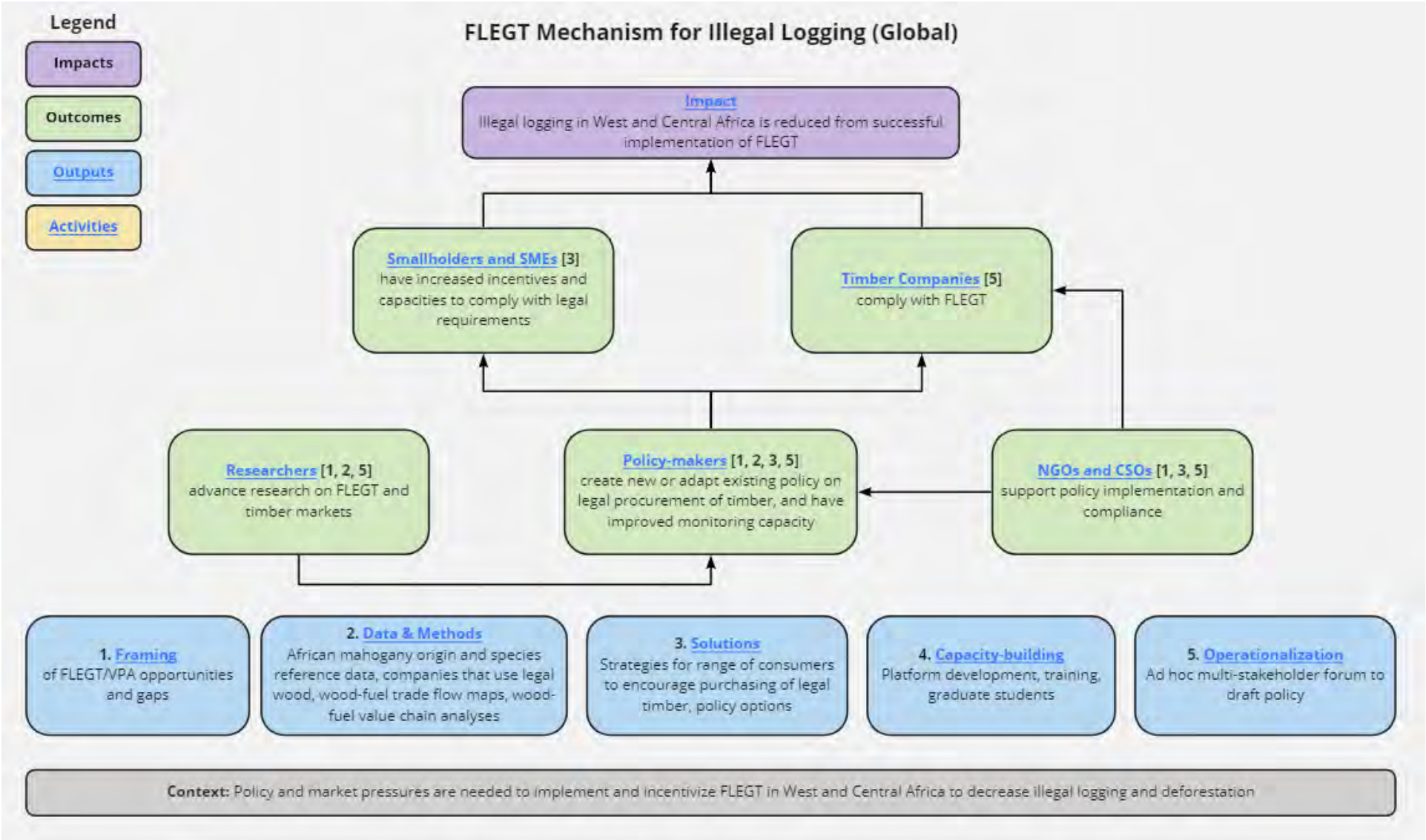


Figure 11: Cluster-level sub-ToC for FTA research on FLEGT

Cluster: Sustainable Forest Management in Mozambique

<i>Project</i>	<i>Centre</i>	<i>Duration</i>	<i>Budget</i>	<i>Countries</i>
Sustaining Forest Resources for People and the Environment in the Niassa National Reserve in Mozambique	Bioversity International	2010-2014	685,900 ³³	Mozambique

Purpose: Sustainable forest management in Mozambique

In Mozambique, FTA's research on sustainable forest management aimed to support the needs for improved management and community development. Approximately 40,000 people who live in Mozambique's Niassa National Reserve (4,200,000 ha) depend on the trees and other natural resources (notably hunting and fishing), as well as agriculture, for their livelihoods. With a particular focus on forest conservation of the miombo woodlands in the reserve, the research engaged communities, reserve managers, and researchers in discussions around forest use, threatened species, conservation, and forest-based livelihoods. The research developed strategies for in-situ conservation management of priority tree species in the Reserve. Based on these interactions, reserve managers were expected to be better equipped to manage the forest resources in the Reserve, stimulate governmental support for the implementation of action plans by national forest agencies, and influence communities to adopt and comply with forest conservation practices. The research also aimed to advance research on forest conservation among local researchers to encourage a critical mass of research efforts in Mozambique. Together, these changes would lead to the sustainable management and conservation of miombo woodlands as well as enhanced and more sustainable livelihoods for surrounding communities.

Potential impact from the cluster:

Hectares of forest under enhanced protection; high-end potential: No evidence found in available project documentation

Estimated amount of CO₂ emissions (Gigatons); high-end potential: Not assessable, as no evidence on high-end potential found in available project documentation

Hectares of forest under enhanced protection; low-end estimate: No evidence found in available project documentation

Estimated amount of CO₂ emissions (Gigatons); low-end estimate: Not assessable, as no evidence on low-end estimate found in available project documentation

³³ Currency currently not retrievable from documentation

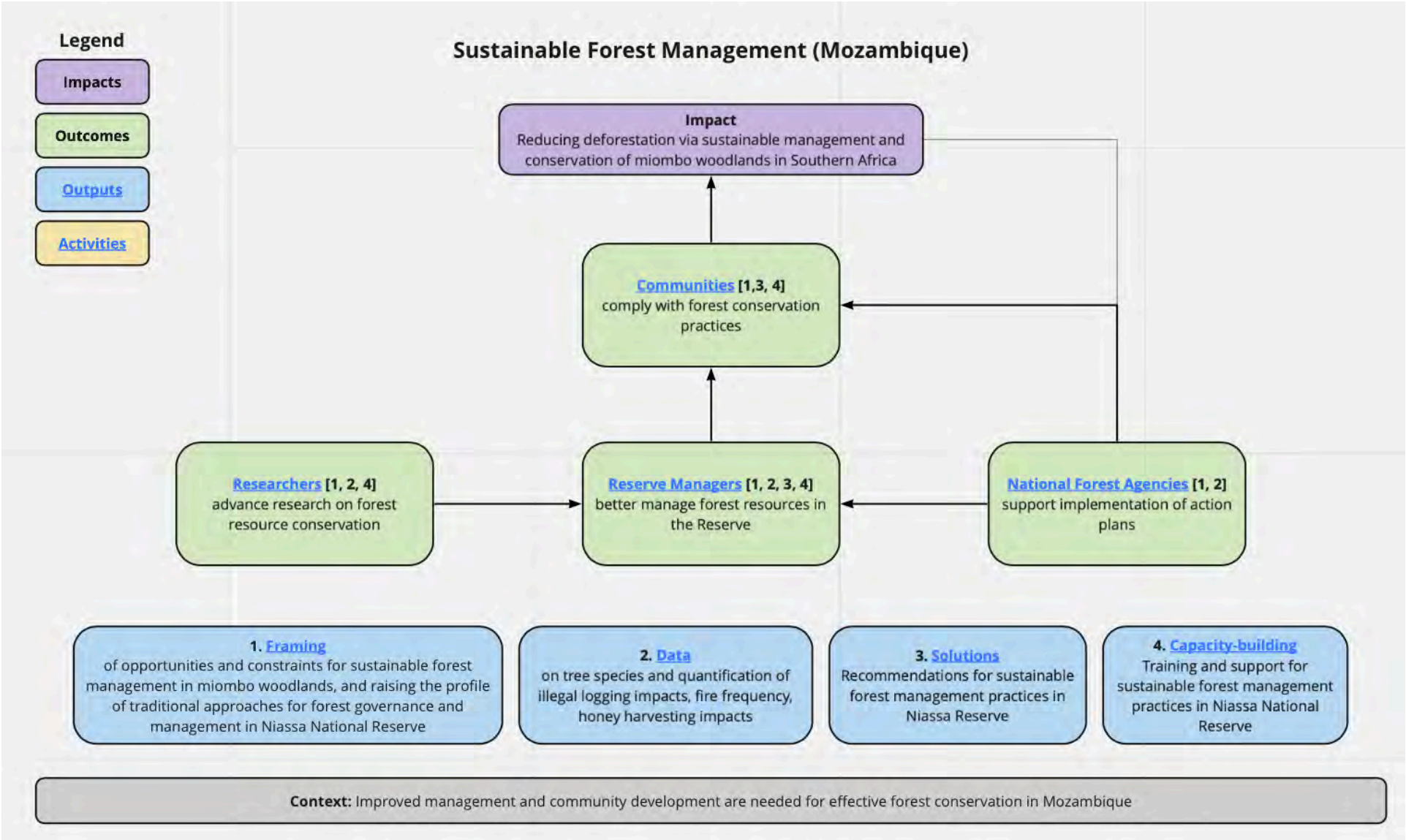


Figure 12: Cluster-level sub-ToC for FTA research on Sustainable Forest Management in Mozambique

Cluster: Timber Markets in Sub-Saharan Africa

<i>Project</i>	<i>Centre</i>	<i>Duration</i>	<i>Budget</i>	<i>Countries</i>
To take stock of community forestry enterprises involved in commercialization of timber in Africa	CIFOR	2014-2015	USD 17,250	Cameroon, Gabon, DRC
Development of Intra-African Trade and Further Processing in Tropical Timber and Timber Products – Phase I [Stage 1]	CIFOR	2015-2016	USD 480,000	Cameroon, Cote D'Ivoire, DRC
DFID KNOWFOR 2: SMEs and Informal Sectors	CIFOR	2015-2017	USD 789,648	Cameroon, DRC, Zambia, Indonesia
Promote and Formalise Artisanal Timber Production in Central Africa (Promouvoir et Formaliser l'Exploitation Artisanale du bois en Afrique Centrale - PROFEAAC)	CIFOR	2019-2023	USD 2,240,000	Cameroon, DRC

Purpose: Sustainable and legal development of timber markets and trade

Better availability of monitoring data and understanding of timber markets, in combination with greater value addition in local supply chains, are needed to incentivize sustainability within timber markets across sub-Saharan Africa. FTA undertook research to take stock of community forestry and small-scale forest enterprises, worked in partnership to develop a methodology for collecting market and trading data, and conducted policy research on strategies for trade development. FTA research framed the contributions of community and small-scale logging to sustainable timber management, developed maps that detail the situation of cross-border trade, forest cover maps, market (demand data), as well as took stock of key issues and challenges that exist for SMEs. The research also produced policy recommendations, monitoring tools, and frameworks to solve key issues, provided training to communities on regulations, technical skills, finance, and commerce, and generated guidance for timber market policy implementation. As a result of these research efforts, it was expected that government policymakers would improve regulations to better enable the commercialization of community forest products and timber, and timber SMEs would become formalized and abide by regulations to improve ecological performance. As a result of changed demand, practice, and policy, there would be a reduction in illegal timber trade and logging activities, which would reduce associated deforestation.

Potential impact from the cluster:

Hectares of forest under enhanced protection; high-end potential: No evidence found in available project documentation

Estimated amount of CO₂ emissions (Gigatons); high-end potential: Not assessable, as no evidence on high-end potential found in available project documentation

Hectares of forest under enhanced protection; low-end estimate: No evidence found in available project documentation

Estimated amount of CO₂ emissions (Gigatons); low-end estimate: Not assessable, as no evidence on low-end estimate found in available project documentation

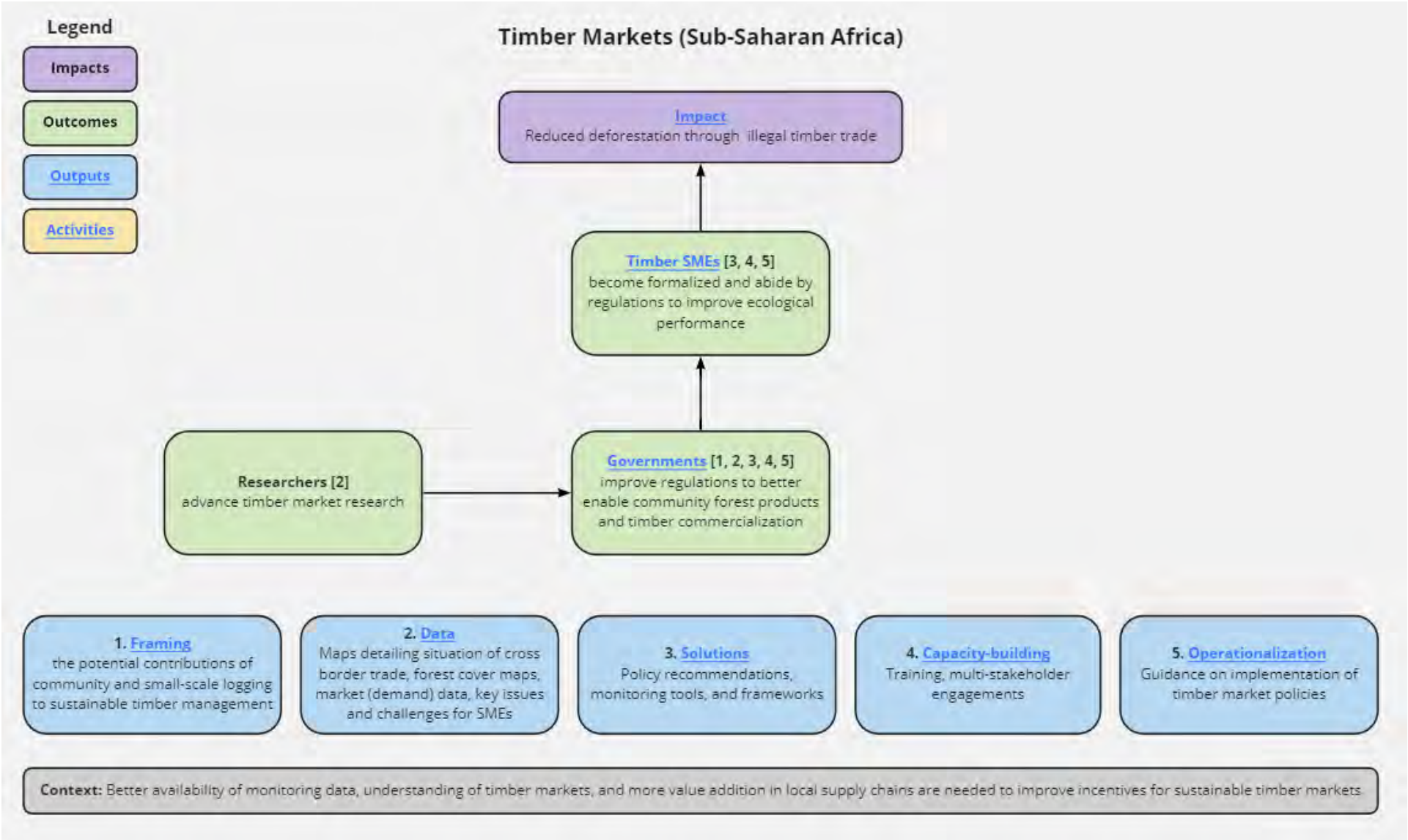


Figure 13: Cluster-level sub-ToC for FTA research on timber markets in Sub-Saharan Africa

Appendix 2. Assessment of Assumptions, Deep Dives

The impact of the PIPPIB in Indonesia rests on several main assumptions:

Assumption	Result	Sensitivity of assumptions on impact ³⁴
Sphere of control		
FTA holds a significantly credible position and is therefore able to exert influence over the way research agendas and policies advance	Sustained, project documentation and interviews with key informants discussed FTA being viewed as a “trusted partner” and highlight how FTA’s position as an impartial provider of evidence-based policy advice was key to the take up and use of FTA knowledge within the development of the LoI	Low – informants suggest that the PIPPIB may have been implemented without FTA’s contribution, therefore, potential impact is still likely
Sphere of influence		
The PIPPIB is effectively implemented and enforced to reach intended targets for reductions in deforestation and there are consequences for deforesting land protected under the moratorium	Sustained, evidence reveals the increased resources spent on enforcement and monitoring of forest cover and the RBP from Norway to Indonesia highlights that first targets have been met in reducing emission levels from deforestation. Policy changes have been sufficient to influence practice and reduce deforestation	Medium – informants state that effective enforcement of the PIPPIB is needed to ensure illegal deforestation does not continue to occur and organizations do not encroach on land covered under the moratorium
Sphere of interest		
FTA contributions to these processes are significant enough to have bearing on the deforestation figures achieved/achievable	Partially sustained, evidence from project documentation and interviews describe how FTA’s research on the causes of deforestation in Indonesia and scientists’ involvement in discussions were contributed indirectly to the LoI and PIPPIB	Medium - FTA provides facts-based information and positions the research for use by those who are interested in picking up the research
GoI does not change the land area protected under the PIPPIB (e.g., does not make exceptions for food estate program)	Partially sustained, interviews with key informants suggest that some exceptions have been made for the food estate program (including for sugar cane and rice), although the GoI is focused on protecting primary forests. Developments in data collection methods have also affected the amount of land covered by the PIPPIB	High – for the high-end potential impact to be reached, it is important that the land covered under the PIPPIB is maintained or increased
GoI uphold their commitment to a new international climate agreement and continue to work in partnership with Norway to promote REDD+ implementation and reduce deforestation-related carbon emissions	Not sustained, the GoI and GoN terminated the LoI in 2021	Medium – time will tell to what extent upholding the moratorium and reducing deforestation and forest degradation will continue to be a priority within Indonesia without the LoI between the GoI and GoN
Large plantation owners in Indonesia uphold commitments to not deforest land protected under the PIPPIB as a result of policy pressure	Partially sustained, large plantation owners have invested in R&D to improve yield and quality of plantations and are committed to zero deforestation. However, some evidence suggests that the private sector may continue to deforest on other land types, taking advantage of loopholes in the policy	High – high-end potential impact can only be achieved if illegal logging does not occur, therefore large plantation owners need to uphold their commitments
Land is not lost to fires or other natural disasters	Not sustained, so far in 2021 (July, 2021), 25,000 ha of land has been burnt by fires (Global Forest Watch)	High – high-end potential impact can only be achieved if land covered under the moratorium is not deforested by natural causes

³⁴ As we move from the sphere of control to interest, the potential impact becomes more sensitive to assumptions

The impact of the M&E on the effectiveness of PFES in Vietnam rests on several main assumptions:

Assumption	Result	Sensitivity of assumptions on impact ³⁵
Sphere of control		
FTA holds a significantly credible position and is therefore able to exert influence over the way research agendas and policies advance	Sustained, FTA in collaboration with key partners, were able to influence the New Forest Law, national and provincial PFES policies and develop an M&E system for the PFES policy which has been taken up in 45 provinces	Medium – informants suggest that FTA were key contributors to the development of the M&E system, without FTA contribution, the indicators may not have been based on rigorous methods
FTA delivers in-demand and effective training and capacity building opportunities to target audiences that are successfully taken-up and scaled	Sustained, FTA supported the capacity building of PFES staff to analyze PFES data which was taken-up and scaled to other provinces	High – without the capacity building of PFES staff in how to effectively use the M&E system, its overall impact would be reduced
Sphere of influence		
Key actors are willing to partake in co-developing M&E system and M&E learning tool	Sustained, the development of the M&E system was a collaborative process which supported its uptake, use, and scaling up across provinces	Medium – co-development of the M&E system and M&E learning tool is more likely to lead to ownership and potential uptake
Key actors are willing and have the capacity to apply the M&E system and M&E learning tool	Partially sustained, government actors (e.g., Ministry) want to develop M&E to increase understanding of PFES. However, results from M&E implementation may reveal weaknesses in PFES implementation thereby questioning the effectiveness of their work leading to some actors not fully applying M&E as proposed by FTA	Medium - the uptake and use of the M&E system by engaged actors is more likely to support the achievement of high-end impact potential
The M&E system is properly implemented and enforced (both financially and with adequate human resources/capacity in place) to realize targets	Sustained, inclusion of M&E in the Forest Law 2017 at national level, national M&E guideline, national financial management guideline reveals the successful enforcement of M&E to realize targets	Medium – informants state how the M&E system supported increased confidence and transparency in PFES, however, the direct impact of M&E on deforestation is less certain
Sphere of interest		
Key actors adopt the M&E framework in the long term	Sustained, 45 provinces have currently adopted the M&E system	Medium - the M&E system provides more accurate payments and transparency in land use, however, there remains conflicting evidence on the full impact of PFES on reducing deforestation
The M&E system supports the effectiveness, efficiency, and equitability of PFES	Sustained, document and interview evidence describe how the M&E system has improved transparency and accuracy of payments to enhance PFES and support improved forest management practices	High – in order for the M&E system to contribute to the high-end impact potential, it must support the effectiveness, efficiency and equitability of PFES to change land-owners behaviors
Policy makers/donors/civil society organizations/government staffs are interested in carrying out rigorous PFES impact assessment	Sustained, the adoption of the M&E system by Son La, Thanh Hoa, Lam Dong, Thua Thien Hue, Cat Tien National Park, Dak Lak reveals the interest in carrying out rigorous PFES impact assessment	High – for high-end impact potential to be reached, there must be interest from key actors in improving the equitability of PFES to instigate behavior change
The M&E system is scaled to other provinces	Partially sustained, the M&E system is currently being implemented by 45 provinces in Vietnam	High – to achieve high-end impact potential, the M&E system must be scaled to other provinces in Vietnam

³⁵ As we move from the sphere of control to interest, the potential impact becomes more sensitive to assumptions

Appendix 3. Disaggregated Cluster Appraisal of Already Existing Evaluation Evidence (by Project) for Challenge 1 (Deforestation and Forest Degradation)

GCS REDD+ Cluster

Project	Evidence Sources	Level of Outcome Evidence (L, M, H), Reliability Assessment, & Confidence	Impact Estimations in Documentation Existing (Y/N) & Reliability Assessment	Further assessment in this study?
<p>Learning from REDD: A Global Comparative Analysis (Phase 1 of GCS REDD+ Program) (<i>CIFOR</i>)</p> <ul style="list-style-type: none"> Indonesia Vietnam Nepal Brazil Peru Bolivia DRC Tanzania Cameroon 	<ul style="list-style-type: none"> 1 evaluation report (2015) 1 proposal/grant contract (2010) 	<p>*reliability: high (external source)</p> <p>*confidence: high</p> <ul style="list-style-type: none"> Government outcomes (M/H): evidence of policy development, but needs more detail, geographic specificity (only mentions one example from Guyana) Partner outcomes (H) Research outcomes (H): evidence of method uptake and use Private sector outcomes (L): no evidence Unexpected outcome: CIFOR's reputation 	<p>Y (noted in an Indonesian policy [forest moratorium] – sensitive to assumptions)</p> <p>[potential/target] 26% reductions in GHG emissions by 2020</p>	<p><i>Outcome level:</i> Assessed for policy, practice and research influence</p> <p><i>Impact level:</i> Assessed and quantified where possible</p>
<p>Learning from REDD+: An enhanced global comparative analysis (Phase 2 of GCS REDD+ program) (<i>CIFOR</i>)</p> <ul style="list-style-type: none"> Cameroon Tanzania Indonesia Vietnam Brazil Peru (a subset of activities done in Burkina Faso, DRC, Mozambique, Papua New Guinea, 	<ul style="list-style-type: none"> 1 evaluation report (2015) 1 final report (2015) 	<p>*reliability: medium (external and self-reported sources)</p> <p>*confidence: high</p> <p>*same as above</p>	<p>*same as above</p>	<p>*same as above</p>

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

<p>Nepal, Bolivia, Guyana)</p>				
<p>Opportunities and Challenges to Developing REDD+ Benefit Sharing Mechanisms in Developing Countries (accompanying phase 2 of GCS REDD+ program) (CIFOR)</p> <ul style="list-style-type: none"> • Brazil • Cameroon • Indonesia • Peru • Tanzania • Vietnam 	<ul style="list-style-type: none"> • 1 evaluation report (2018) • 1 outcome story • 1 proposal/grant contract (2011) 	<p>*reliability: medium (external and self-reported sources) *confidence: high</p> <ul style="list-style-type: none"> • Government outcomes (M): needs more detail on type of learning • Partner outcomes (M): needs more detail on practice change among actors/networks supporting cross-sector approaches for low emissions development • Research outcomes (M): indications of uptake/use • Private sector outcomes (M): indications of MRV adherence/uptake 	<p>Y (impact estimations noted in evaluation report and outcome story) – external evaluation and self-reported</p> <p>[potential] Peru (National REDD+ Benefit Sharing Strategy)</p> <p>[potential] Vietnam (Monitoring and evaluation system for environmental compensation, PFES: 3-5m ha/year)</p>	<p><i>Outcome level:</i> Assessed for policy, practice and research influence</p> <p><i>Impact level:</i> Assessed and quantified where possible</p>
<p>REDD: Research to Support Design and Implementation (accompanying phase 2 of GCS REDD+ program) (CIFOR)</p> <ul style="list-style-type: none"> • Indonesia • Vietnam • Papua New Guinea • Nepal • Tanzania • Burkina Faso • Mozambique • Cameroon • Peru • Brazil • Bolivia 	<ul style="list-style-type: none"> • 1 evaluation report of benefit sharing project (2015) • 1 Viet Nam outcome story report (n.d.) • 1 outcome story for Peru 	<p>*reliability: medium (external and self-reported sources) *confidence: high</p> <ul style="list-style-type: none"> • Government (H): evidence for Brazil, Vietnam, Peru • Partners (L/M): COP and UNFCCC participation but unclear whether evidence used to help inform decisions • Research (L): lacks specificity, need details of country-level partnerships with young academics • Private sector (L): minimal evidence in Vietnam about pilot implementation 	<p>Y (impact estimations noted in outcome stories) – self-reported</p> <p>[potential] Vietnam (PFES budget supports forest protection)</p> <p>[potential] Peru (national strategy for climate change, national commitment to climate change)</p>	<p><i>Outcome level:</i> Assessed for policy, practice and research influence</p> <p><i>Impact level:</i> Assessed and quantified where possible</p>

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

<p>A Global Comparative Study for achieving effective, efficient and equitable REDD+ results (Phase 3 of GCS REDD+ program) (CIFOR)</p> <ul style="list-style-type: none"> Brazil Indonesia Peru Ethiopia Guyana Myanmar DRC Vietnam 	<ul style="list-style-type: none"> 1 midterm review/evaluation report (2019) 	<p>*reliability: high (external source) *confidence: high</p> <ul style="list-style-type: none"> Government outcomes (M): needs more detail on type of learning Partner outcomes (M): needs more detail on practice change among actors/networks supporting cross-sector approaches for low emissions development Research outcomes (M): indications of uptake/use Private sector outcomes (M): indications of MRV adherence/uptake 	<p>Y (not quantified – qualified in terms of improving target countries to achieve and assess carbon and non-carbon benefits)</p>	<p><i>Outcome level:</i> Assessed for policy, practice and research influence</p> <p><i>Impact level:</i> Assessed and quantified where possible</p>
<p>From Climate Research to Action under Multilevel Governance: Building Knowledge and Capacity at Landscape Scale (MLG) (CIFOR)</p> <ul style="list-style-type: none"> Indonesia Mexico Peru Vietnam 	<ul style="list-style-type: none"> 1 final report (2019) 1 evaluation report (2019) 	<p>*self-reported – lower reliability *confidence: medium</p> <ul style="list-style-type: none"> Government outcomes (M): indication of project inputs to and uptake in countries' national REDD+ and climate change strategies and MRV system Partner outcomes (L) Research outcomes (L) Private sector outcomes (L): indication of learning via GLF, indication of PS commitment to addressing climate change 	<p>N</p>	<p><i>Outcome level:</i> Assessed for research, practice and policy outcomes</p> <p><i>Impact level:</i> Not quantifiable</p>
<p>Reducing emissions from deforestation and degradation through alternative land-uses in rainforests of the tropics (REDD-ALERT) (CIFOR/ICRAF)</p> <ul style="list-style-type: none"> Cameroon 	<ul style="list-style-type: none"> 1 peer-reviewed article (discusses how project supported evaluation of REDD mechanisms) 	<p>* reliability: high (peer-reviewed source) *confidence: medium</p> <ul style="list-style-type: none"> Government outcomes (L): indication of learning <p>No evidence of outcomes – mostly focuses on outputs</p>	<p>N</p>	<p><i>Outcome level:</i> Assessed for practice and research influence</p> <p><i>Impact level:</i> Not quantifiable</p>

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

<ul style="list-style-type: none"> Peru Vietnam 				
<p>Impacts of Reducing Emissions from Deforestation and Forest Degradation and Enhancing Carbon Stocks (IREDD+) (CIFOR/ICRAF)</p> <ul style="list-style-type: none"> China Indonesia Vietnam 	<ul style="list-style-type: none"> 1 final report (2014) 	<p>*reliability: low (self-reported source) *confidence: low</p> <ul style="list-style-type: none"> Government outcomes (L/M): indications of gov't and REDD+ negotiator learning and attitude change Partner outcomes (L/M): indicators of partner support, capacity-building of local-level REDD task force partners (Laos) Research outcomes (L): local researcher capacities, outputs discussed but not how used, uptake by media Community outcomes (L/M): indications of public awareness via media uptake and PLUP activities 	N	<p><i>Outcome level:</i> Assessed for research, policy and practice influence</p> <p><i>Impact level:</i> Not quantifiable.</p>
<p>SECURED Landscapes: Sustaining Ecosystem and Carbon benefits by Unlocking Reversal of Emissions Drivers in Landscapes (ICRAF)</p> <ul style="list-style-type: none"> Cameroon DRC Indonesia Vietnam Peru 	<ul style="list-style-type: none"> 1 interim report 1 final report 	<p>*reliability: low (self-reported sources) *confidence: medium</p> <ul style="list-style-type: none"> Government outcomes (H): indications of learning/training, indication of Indonesian province-level and use of tools, evidence of NDC contributions, indications of gov't interest in LUWES tool (Peru, Cameroon, Vietnam) Partner outcomes (L): indication of TMP continued involvement Private sector outcomes (M): 24 Peruvian companies involved in carbon market (measure, management, offsetting emissions); Indonesian company (WKS) did calculations and defined a mitigation plan Research outcomes (L) 	<p>Y (projected) – questionable reliability</p> <p>[target] total of 1,210,682 ha of landscapes covered by forests and total 660,234 ha of landscapes covered by sustainable land use plans in Cameroon, Peru, Indonesia, and DRC</p> <p>[potential] estimated potential emissions reductions over 1 year (6,081,361 tonnes CO₂)</p> <p>[potential] project reach: min. 2250 people engaged, potential for 98,980</p> <p>212 ha of forest regenerated in Vietnam (under implementation of community forest management regime)</p>	<p><i>Outcome level:</i> Assessed policy, practice and research influence</p> <p><i>Impact level:</i> Not quantifiable</p>

Role of Wetlands in Climate Change Cluster

Project	Evidence Sources	Level of Outcome Evidence (L, M, H), Reliability Assessment, & Confidence	Impact Estimations in Documentation Existing (Y/N) & Reliability Assessment	Further assessment in this study?
<p>Sustainable Wetlands Adaptation and Mitigation Programme (SWAMP) (CIFOR)</p> <ul style="list-style-type: none"> Liberia Senegal Gabon Mozambique Tanzania Mexico Peru Colombia Ecuador Indonesia India Cambodia Philippines Papua New Guinea 	<ul style="list-style-type: none"> 2 theory-based outcome evaluation articles (1 focal, 1 part of a comparative paper) 1 ISPC brief + corresponding article (Flores, 2016) 1 final report (2013) 1 project proposal/grant contract 	<p>*reliability: medium to high (external, peer-reviewed, and self-reported sources)</p> <p>*confidence: high</p> <ul style="list-style-type: none"> International policy outcomes (M): IPCC accept wetland agenda via SWAMP contribution to global reference (Wetlands Supplement) to Paris Agreement National policy outcomes (M/H): Used to calculate Indonesia's FREL, supported development of REDD+ National Strategy, using ground biomass calculations. Unclear exact policy changes that manifest (too early to say at time of evaluation) Partner outcomes (M/H): need more detail on GEF-funded project on blue forests Research (H) Private sector (M/H): Private sector approaches to building coastal infrastructure; developed climate adaptation and mitigation strategies for local community development (unexpected) 	<p>Y (noted in Flores, 2016) – though results indicate net negative impact</p> <p>Flores (2016) assessment [potential]: “analysis shows that if the moratorium were to achieve full protection, Indonesia could avoid the release of 10-20 million tons of carbon dioxide over the next 15 years, which corresponds to a mean social value of \$402 – 805 million using a \$40/tonne social cost of carbon. With SWAMP's timely knowledge generation on tropical wetland carbon dynamics we estimate that \$4.03 – 40.26 million of these social benefits can be attributed to CIFOR” (thesis abstract)</p>	<p><i>Outcome level:</i> Assessed for policy, practice and research influence</p> <p><i>Impact level:</i> Assessed and quantified where possible</p>
<p>Characterizing and Assessing Palm Swamp Degradation in the Peruvian Amazon (CIFOR)</p> <ul style="list-style-type: none"> Peru 	<p>1 peer-reviewed article (2017)</p> <p>1 project proposal/grant agreement</p> <p>*ongoing project (possibly too young)</p>	<p>* reliability: medium (peer-reviewed and self-reported sources)</p> <p>*confidence: low</p>	<p>Y (projected) – not reliable</p> <p>[potential] Target: Improve the protection and management of 350,000 ha area Palm Swamp ecosystem in the Pastaza-Marañon Basin area that will lead to the enhancement of carbon storage amounts which are nationally and globally significant</p>	<p><i>Outcome level:</i> Project too young</p> <p><i>Impact level:</i> Not quantifiable</p>
<p>Sustainable Wetlands Adaptation and Mitigation Program</p>	<ul style="list-style-type: none"> 8 interim reports (2017-2018) 	<p>*reliability: low (self-reported sources)</p> <p>*confidence: low</p> <p>No evidence of outcomes – reports mostly focus on outputs</p>	<p>N</p>	<p><i>Outcome level:</i> Limited evidence base.</p> <p><i>Impact level:</i> Not quantifiable</p>

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

<p>(SWAMP): Phase 2 (CIFOR)</p> <ul style="list-style-type: none"> Kenya Cameroon India Indonesia Vietnam Brazil Colombia Ecuador Mexico Peru 				
<p>Sustainable Wetlands Adaptation and Mitigation Program (SWAMP) 2019 (CIFOR)</p> <ul style="list-style-type: none"> Tanzania Kenya Indonesia Vietnam Peru Mozambique Gabon Cameroon 	<ul style="list-style-type: none"> 4 interim (2019) 1 project proposal (2019) 	<p>*reliability: low (self-reported sources) *confidence: low to medium</p> <ul style="list-style-type: none"> National policy outcomes (L): expected outcomes discussed International policy outcomes (L): expected outcomes discussed 	<p>Y (expected but not quantified) –not reliable</p> <p>[potential] Measurable change on the ground in how wetlands are managed (conserved and restored wetlands)</p>	<p><i>Outcome level:</i> Assessed for policy, practice, and research influence</p> <p><i>Impact level:</i> Assessed and quantified where possible</p>
<p>Mainstreaming Wetlands into the Climate Agenda: A multi-level approach (SWAMP-II) (CIFOR)</p> <ul style="list-style-type: none"> All 	<ul style="list-style-type: none"> 3 interim reports <p>*ongoing project (too young?)</p>	<p>*reliability: low (self-reported sources) *confidence: low to medium</p> <ul style="list-style-type: none"> National policy outcomes (L): expected outcomes discussed International policy outcomes (L): expected outcomes discussed 	<p>Y (intended noted, but not quantified) – not reliable (assumption: avoiding GHG emissions from wetland conservation globally)</p>	<p><i>Outcome level:</i> Assessed for policy and practice influence</p> <p><i>Impact level:</i> Not quantifiable</p>

Fire and Haze in Indonesia Cluster

Project	Evidence Sources	Level of Outcome Evidence (L, M, H), Reliability Assessment, & Confidence	Impact Estimations in Documentation Existing (Y/N) & Reliability Assessment	Further assessment in this study?
<p>Political Economy Study of Fire and Haze in Indonesia (CIFOR)</p> <ul style="list-style-type: none"> Indonesia 	<ul style="list-style-type: none"> 1 outcome story 1 performance story (theory-based external outcome evaluation with primary data collection) 1 article (theory-based outcome evaluation) 1 annual report 1 ToC 	<p>*reliability: medium (external and self-reported sources) *confidence: high</p> <ul style="list-style-type: none"> Government outcomes (H) NGO / ally outcomes (H) Research outcomes (M): requires update of bibliometrics Private sector outcomes (M): evidence points to influence being low and outcomes partially achieved, but did lead to follow up MoU with palm oil pulp and paper company Public outcomes (M) 	<p>Y (from annual report – self-reported, hence reliability unclear) (assumption: perfect implementation of policy needed)</p> <p>CIFOR helped develop the ‘Grand Design for Fire Prevention for 2017-2019’ as the standard for fire prevention in order to:</p> <ol style="list-style-type: none"> 1. Ensure that the peatland working area of Peatland Restoration Agency (BRG) as large as 2.4 million hectares were not burned; 2. Ensure that the 731 villages identified by the KHLK and Forestry as prone to fire are not burned 	<p><i>Outcome level:</i> Assessed for policy, practice and research influence</p> <p><i>Impact level:</i> Assessed and quantified where possible</p>
<p>DFID Know-for 2: Political economy of fire and haze (CIFOR)</p> <ul style="list-style-type: none"> Indonesia 	*same as above	*same as above	*same as above	*same as above
<p>Disaster Preparedness Specific Discipline Integrated Programme in Riau, Indonesia (CIFOR)</p> <ul style="list-style-type: none"> Indonesia 	<ul style="list-style-type: none"> 1 final report <p>*recently concluded</p>	<p>*reliability: low (self-reported source) *confidence: medium</p> <ul style="list-style-type: none"> Government outcomes (M): preliminary evidence of gov’tal support and policy change NGO outcomes (L): need to verify NGO/ally support, needs more detail Research outcomes (M) Private sector outcomes (L): PS engaged, but unclear what resulted Public outcomes (M): media uptake indicates influence on public awareness 	<p>Y</p> <p>[potential] Project pilots community-based fire prevention and peatland restoration models on 11.1 ha</p>	<p><i>Outcome level:</i> Assessed for policy and practice influence</p> <p><i>Impact level:</i> Not quantifiable, particularly considering resource constraints</p>

Agroforestry Concessions in Peru Cluster

Project	Evidence Sources	Level of Outcome Evidence (L, M, H), Reliability Assessment, & Confidence	Impact Estimations in Documentation Existing (Y/N) & Reliability Assessment	Further assessment in this study?
<p>Support to the Development of Agroforestry Concessions in Peru (SUCCESS) (ICRAF)</p> <ul style="list-style-type: none"> Peru 	<ul style="list-style-type: none"> 1 outcome evaluation report (2019) 	<p>*reliability: high (external source) *confidence: high</p> <ul style="list-style-type: none"> Government outcomes (H): policy changes too nascent Partner outcomes (H) Research outcomes (M/H): low evidence of external researcher uptake Smallholder outcomes (L): low primary evidence from smallholders/farmers associations 	<p>Y (derived from project data – likely reliable as it was scientifically calculated)</p> <p>[potential] 1 million ha of land and 452 000 ha of forest eligible for AFCs</p> <p>[potential] 20% carbon emissions reduction (estimation of successful widespread implementation of AFCs)</p>	<p><i>Outcome level:</i> Assessed for policy, practice and research influence</p> <p><i>Impact level:</i> Quantified and assessed where possible</p>
<p>Peru's Agroforestry Concessions Scheme: Collaborative Action to secure Multi-level Readiness for Implementation of an Innovative, Transformative Policy Project (ICRAF)</p> <ul style="list-style-type: none"> Peru 	<ul style="list-style-type: none"> 1 webpage 5 press releases <p>*New project (too young to evaluate)</p>	No evidence	None stated	<p><i>Outcome level:</i> Project too young</p> <p><i>Impact level:</i> Not quantifiable</p>
<p>PARA: Piloting approaches to rural advisory services in support of scaling of the Agroforestry Concessions scheme in Peru (ICRAF)</p> <ul style="list-style-type: none"> Peru 	<p>No evidence</p> <p>*New project (too young to evaluate)</p>	No evidence	<p>Y (projection noted in project proposal)</p> <p>[potential] 1.5 million ha of forest land in Peru eligible for AFCs (similar numbers to SUCCESS – already be captured, remove from impact to avoid double counting)</p>	<p><i>Outcome level:</i> Assessed for policy, practice, and research influence</p> <p><i>Impact level:</i> Already captured in SUCCESS project</p>

SFM in Mesoamerica Cluster

Project	Evidence Sources	Level of Outcome Evidence (L, M, H), Reliability Assessment, & Confidence	Impact Estimations in Documentation Existing (Y/N) & Reliability Assessment	Further assessment in this study?
<p>Forestry to enhance livelihoods and sustain forests in Mesoamerica: How institutional arrangements and value chains affect benefits and resources (<i>Bioversity International</i>)</p> <ul style="list-style-type: none"> Guatemala Nicaragua 	<ul style="list-style-type: none"> 1 annual progress report (2016) 1 final report (2017) 2 external press releases (2019, 2019) 1 FTA press release (2021) 1 external webpage (n.d.) 1 project proposal (n.d.) 	<p>*reliability: medium (external & self-reported sources) *confidence: high</p> <ul style="list-style-type: none"> Government outcomes (L): stated intentions only; Guatemala only Forest cooperatives/ partner outcomes (M) Researcher outcomes (H) Community outcomes (H): need more qualification of community learning and changed behaviours; Guatemala only Unexpected outcomes (H): community-related; Guatemala only 	<p>Y (potential impact noted in self-reported source, triangulated with external sources) [potential] 9 community forestry concessions in Maya Biosphere Reserve covering 350,000 ha reduced deforestation to <0.1% per year (potential for 25-year contract renewal; 1 was renewed in December 2019 [Cooperativa Carmelita covers 53,597 ha])</p>	<p><i>Outcome level:</i> Assessed for policy, practice and research influence</p> <p><i>Impact level:</i> Assessed where possible</p>

Sustainable Forest Enterprises in Cameroon Cluster

Project	Evidence Sources	Level of Outcome Evidence (L, M, H), Reliability Assessment, & Confidence	Impact Estimations in Documentation Existing (Y/N) & Reliability Assessment	Further assessment in this study?
<p>DRYAD (ICRAF)</p> <ul style="list-style-type: none"> Cameroon 	<ul style="list-style-type: none"> 1 blog (2020) 1 end-of-project presentation (2020) 1 final report (2020) 1 working paper (2021) 	<p>*reliability: medium (self-reported, but based on FMS data) *confidence: high</p> <ul style="list-style-type: none"> Government outcomes (L) Investor outcomes (L): no evidence Implementing organization outcomes (L) CFE outcomes (H) 	<p>Y – self reported, but based on FMS data</p> <p>[Target] 150 000 ha of community forests will be sustainably managed, reducing instances of illegal logging and deforestation</p>	<p><i>Outcome level:</i> Assessed for policy, practice, and research influence</p> <p><i>Impact level:</i> Assessed and quantified where possible</p>

Oil Palm in Indonesia Cluster

Project	Evidence Sources	Level of Outcome Evidence (L, M, H), Reliability Assessment, & Confidence	Impact Estimations in Documentation Existing (Y/N) & Reliability Assessment	Further assessment in this study?
<p>Supporting local regulations for sustainable oil palm in East Kalimantan (<i>CIFOR</i>)</p>	<ul style="list-style-type: none"> 1 outcome evaluation (2020) 1 final report (2012) 	<p>*reliability: medium to high (external and self-reported sources) *confidence: high</p> <ul style="list-style-type: none"> Government outcomes (H): indications of future policy change Partner outcomes (H) 	<p>N</p>	<p><i>Outcome level:</i> Assessed for policy, practice, and research influence</p> <p><i>Impact level:</i> Assessed and quantified where possible</p>

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

<ul style="list-style-type: none"> Indonesia 		<ul style="list-style-type: none"> Research outcomes (M/L) Corporations outcomes (L): no evidence to date 		
<p>Governing Oil Palm Landscapes for Sustainability (GOLS) (CIFOR)</p> <ul style="list-style-type: none"> Indonesia 	<ul style="list-style-type: none"> 1 CUF evaluation report (2019) 1 outcome evaluation (2020) 1 CIFOR annual report (2017) 	<p>*reliability: medium to high (external and self-reported sources)</p> <p>*confidence: high</p> <ul style="list-style-type: none"> Government outcomes (M): policy changes are too nascent Partner outcomes (H) Research outcomes (H) Corporations outcomes (L): lack evidence of PS learning from project and changes to practice (no primary evidence from oil palm companies) 	N	<p><i>Outcome level:</i> Assessed for policy, practice and research influence</p> <p>=</p> <p><i>Impact level:</i> Not quantifiable</p>
<p>Oil Palm Adaptive Landscapes (OPAL) (CIFOR)</p> <ul style="list-style-type: none"> Indonesia 	<ul style="list-style-type: none"> 1 outcome evaluation (2020) 1 CIFOR annual report (2017) 	<p>*reliability: medium to high (external and self-reported sources)</p> <p>*confidence: high</p> <ul style="list-style-type: none"> Government outcomes (M/H): some policy changes are too nascent Partner outcomes (H) Research outcomes (H): project is still underway Smallholder outcomes (L/M): low primary evidence from smallholders/farmers associations 	N	<p><i>Outcome level:</i> Assessed for policy, practice, and research influence</p> <p><i>Impact level:</i> Not quantifiable</p>
<p>DFID Know-for 2: Corporate Commitments to Sustainability (CIFOR)</p> <ul style="list-style-type: none"> Indonesia 	1 project proposal/grant contract (2015)	No evidence	N	<p><i>Outcome level:</i> Assessed for policy, practice and research influence</p> <p><i>Impact level:</i> Not quantifiable</p>

SFM in Congo Basin Cluster

Project	Evidence Sources	Level of Outcome Evidence (L, M, H), Reliability Assessment, & Confidence	Impact Estimations in Documentation Existing (Y/N) & Reliability Assessment	Further assessment in this study?
Appui a la politique Nationale de conservation et gestion des forets et de la biodiversite en republique	<ul style="list-style-type: none"> 1 final report (2016) 1 proposal/grant contract (2012) 	<p>*reliability: low (self-reported sources)</p> <p>*confidence: low</p> <ul style="list-style-type: none"> Government outcomes (L): indications of increased capacities, but lacks detail, no indications of policy change 	N	<p><i>Outcome level:</i></p> <p>This project was more focused on establishing university infrastructure and a program than deforestation. Research influence has been assessed</p>

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

democratique du Congo (REFORCO) (CIFOR) • DRC		<ul style="list-style-type: none"> Research outcomes (H): *maybe overlap with FCCC project Donor/international org outcomes (M/H): need more detail 		<i>Impact level:</i> Not quantifiable
Forests and Climate Change in Congo (FCCC) (CIFOR, ICRAF) • DRC	<ul style="list-style-type: none"> 1 final report (2016) 1 proposal/grant contract (2012) 	<p>*reliability: low (self-reported sources) *confidence: low-medium</p> <ul style="list-style-type: none"> Government outcomes (H): indications of learning, capacity, and action/policy change that need verification NGO outcomes (H) Research outcomes (H) Donor/int. org outcomes (M/H): indications of relationships and learning/capacity but needs more detail Timber company outcomes (L): indication of graduate students now working in private sector 	<p>Y (self-reported in appendix of report – both targets/indicators and achieved, detailed methodological backing/transparent limitations to quantify)</p> <p>[potential – needs verification] Virunga Foundation's (partner) plants 4600 ha of trees in agroforestry plantations; estimating approx. 1.4m tonnes of CO₂ stocked</p> <p>[potential – needs verification] Virunga National Park rehabilitates 5000 ha of natural forests; aim to increase CO₂ sequestered by 10% between 2013-2017</p>	<p><i>Outcome level:</i> Policy, practice and research influence assessed</p> <p><i>Impact level:</i> Assessed and quantified where possible</p>
Yangambi, pole scientifique au service de l'homme et des forets (CIFOR) • DRC	<ul style="list-style-type: none"> 1 technical report (2019) 1 logic framework (2017) 1 project proposal (n.d.) 	<p>*reliability: low (self-reported sources) *confidence: low</p> <ul style="list-style-type: none"> Government outcomes (L/M): indications of changes in governance arrangements but need more detail Research outcomes (M) Donor/int. org outcomes (H) Timber company outcomes (L): indications for future outcomes (possibly too early to manifest) Community outcomes (L/M): indications of community awareness of project and engagement, but lack detailed evidence of resulting changes 	N	<p><i>Outcome level:</i> Practice and research influence assessed</p> <p><i>Impact level:</i> Not quantifiable</p>
Nouveaux Paysages du Congo (CIFOR) • DRC	<p>1 proposal (n.d.) 1 mid-term report (2019) *ongoing project</p>	<p>*reliability: low (self-reported sources) *confidence: low</p> <ul style="list-style-type: none"> Government outcomes (L): limited evidence Donor outcomes (L) 	N	<p><i>Outcome level:</i> Project too young</p> <p><i>Impact level:</i> Not quantifiable, particularly considering infancy of the project</p>

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

		<ul style="list-style-type: none"> Researcher outcomes (L): no evidence NGO outcomes (L) Timber company outcomes (M) <p>Community outcomes (M)</p>		
Aide à l'application des normes FSC sur la régénération et la diversité génétique des essences du bassin du Congo (COMIFAC) (<i>Bioversity International</i>)	No evidence	No evidence	N	<p><i>Outcome level:</i> Not possible considering resource constraints.</p> <p><i>Impact level:</i> Not quantifiable</p>
<p>Beyond Timber: Reconciling the Needs of Logging Industry with those of Forest-dependent People (AFDB) (<i>Bioversity International</i>)</p> <ul style="list-style-type: none"> Cameroon DRC Gabon 	<ul style="list-style-type: none"> 1 quarterly report (2014) 1 final report (2014) 1 brief (2016) 	<p>*reliability: low (self-reported sources)</p> <p>*confidence: low</p> <ul style="list-style-type: none"> Government outcomes (L/M): indications of governmental benefits, but need more detail and evidence Research outcomes (H): some gender-disaggregated evidence Donor/int. org outcomes (H) Timber company outcomes (M): indications of learning and training given – needs validation Community outcomes (L): indications of concessionaire learning, engagement, and relationships with research team 	N	<p><i>Outcome level:</i> Assessed for policy, practice and research influence</p> <p><i>Impact level:</i> Not quantifiable.</p>

FLEGT/VPA Cluster

Project	Evidence Sources	Level of Outcome Evidence (L, M, H), Reliability Assessment, & Confidence	Impact Estimations in Documentation Existing (Y/N) & Reliability Assessment	Further assessment in this study?
Appui technique au Ministère des Forêts et de la Faune pour l'opérationnalisation	<ul style="list-style-type: none"> 1 report (State of timber sector in Cameroon) (2015) 	<p>*reliability: low (self-reported sources)</p> <p>*confidence: low</p> <p>No evidence (reports emphasize outputs; main project contribution appears to be</p>	Y (not verifiable)	<p><i>Outcome level:</i> Limited initial evidence base and small project budget (<\$50 000USD)</p>

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

n de la page web et la collecte de données dans le cadre de la mise en œuvre de l'Annexe VII de l'APV/FLEGT (CIFOR)	<ul style="list-style-type: none"> 1 proposal/grant contract (n.d.) 	VPA website Annex VII, which is not available from a Google search)		<i>Impact level:</i> Not quantifiable, particularly considering resource constraints
<p>Collecting evidence of FLEGT VPA-impacts for improved FLEGT communication (CIFOR)</p> <ul style="list-style-type: none"> Ghana Cameroon Indonesia <p>Upcoming countries:</p> <ul style="list-style-type: none"> DRC Cote d'Ivoire Honduras Guyana 	<ul style="list-style-type: none"> 1 final report (2019) 	<p>*reliability: low (self-reported source)</p> <p>*confidence: low</p> <ul style="list-style-type: none"> Policymaker outcomes (L): only mentions expected outcomes 	Y (not verifiable) (assumption: project outputs demonstrate positive impact of FLEGT to encourage investment in FLEGT/VPA and policies to reduce deforestation/illegal logging)	<p><i>Outcome level:</i> Requires intensive data collection, not possible considering resource constraints</p> <p><i>Impact level:</i> Not quantifiable</p>
<p>Réalisation d'une étude de caractérisation des différents types d'offres et de demandes en bois et produits dérivés dans les marchés publics en Côte d'Ivoire (CIFOR)</p> <ul style="list-style-type: none"> Cote d'Ivoire 	<ul style="list-style-type: none"> 1 interim report (2019) 1 final report (n.d.) 1 presentation (2018) 1 proposal/grant contract (n.d.) 	<p>*reliability: low (self-reported sources)</p> <p>*confidence: low</p> <ul style="list-style-type: none"> Policymaker outcomes (L): only mentions expected outcomes 	Y (expected policy) – though not reliable (assumption: enhanced regulated and sustainable timber production via new policy □ decreased illegal logging and increased demand of legal sawn wood for public procurements)	<p><i>Outcome level:</i> Policy influence assessed</p> <p><i>Impact level:</i> Not quantifiable, particularly considering resource constraints</p>
Essor des demandes publiques et	<ul style="list-style-type: none"> 1 final report (2019) 	<p>*reliability: low (self-reported sources)</p> <p>*confidence: low</p>	Y (expected policy change) – though not reliable (assumption: enhanced regulated and sustainable timber production via new	<p><i>Outcome level:</i> Policy influence assessed</p> <p><i>Impact level:</i></p>

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

privées camerounaises en sciages d'origine légale (CIFOR) • Cameroon	<ul style="list-style-type: none"> 1 proposal/grant contract (n.d.) 1 mid-term report (2018) 	<ul style="list-style-type: none"> Policymaker outcomes (L): only intended outcomes discussed 	policy □ decreased illegal logging and increased demand of legal sawn wood for public procurements)	Not quantifiable, particularly considering resource constraints
Policy and regulatory options to recognise and better integrate the domestic timber sector in tropical countries (PROFORMAL) (CIFOR) • Cameroon • Gabon • DRC • Ecuador • Indonesia	<ul style="list-style-type: none"> 1 evaluation report (2014) 1 brief (2014) 1 proposal/grant contract (n.d.) 5 mid-term reports (2010 - 2013) 	<p>*reliability: medium (external and self-reported sources) *confidence: low-medium</p> <ul style="list-style-type: none"> Policymaker outcomes (M): contributed to forest law in Cameroon Research outcomes (M): evidence of graduate student capacity-building Timber company outcomes (L): does not report related outcomes Smallholder/SME outcomes (L): does not report related outcomes 	N	<p><i>Outcome level:</i> Policy, practice, and research influence assessed</p> <p><i>Impact level:</i> Not quantifiable, particularly considering resource constraints</p>
Governing multifunctional landscapes (GLM) in Sub Saharan Africa: Managing trade-offs between social and ecological impacts (CIFOR, ICRAF) • Cameroon • Ghana • DRC • Gabon • Zambia • Kenya	<ul style="list-style-type: none"> 1 narrative report (2020) 1 proposal/grant contract (n.d.) <p>*ongoing project (may be too young)</p>	<p>*reliability: low (self-reported sources) *confidence: low</p> <ul style="list-style-type: none"> CSO outcomes (L): only expected outcomes discussed Smallholder/SME outcomes (L): only expected outcomes discussed Policymaker outcomes (L): only expected outcomes discussed Research outcomes (L): only expected outcomes discussed 	Y (not verifiable, impact expected but not documented/ quantified) (assumption: minimize the impact of agri-business and timber business on deforestation, better understanding of impacts of FLEGT initiative; more sustainably and inclusively governing land and forests and access to resources, diversification and promotion of diets and nutrition. Combined with direct benefits to the FLEGT community, smallholders, forest dependent communities, SMEs, and vulnerable groups such as women and youth)	<p><i>Outcome level:</i> Policy and practice influence assessed, project still in progress</p> <p><i>Impact level:</i> Not quantifiable, particularly considering resource constraints</p>
Developing DNA timber tracking tools and a conservation strategy for African mahogany (Khaya senegalensis) in	<ul style="list-style-type: none"> 1 technical report (n.d.) 	<p>*reliability: low (self-reported source) *confidence: low No evidence</p>	Y (projection) – though not reliable [project output] Project generated a large database of African mahogany covering 18 countries useful for timber legality verification; and have conservation strategies for two species ready to be	<p><i>Outcome level:</i> Not possible, requires intensive data collection.</p> <p><i>Impact level:</i> Not quantifiable, particularly considering resource constraints</p>

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

West Africa (<i>Bioversity International</i>)			implemented with practical uses also for restoration in 4 countries.	
<ul style="list-style-type: none"> • Benin • Burkina Faso • Ghana • Togo 				

SFM in Mozambique Cluster

Project	Evidence Sources	Level of Outcome Evidence (L, M, H), Reliability Assessment, & Confidence	Impact Estimations in Documentation Existing (Y/N) & Reliability Assessment	Further assessment in this study?
Sustaining Forest Resources for People and the Environment in the Niassa National Reserve in Mozambique (<i>Bioversity International</i>) <ul style="list-style-type: none"> • Mozambique 	<ul style="list-style-type: none"> • 1 midterm report (2012) • 1 final report (2014) • 1 project proposal (n.d.) • 1 presentation (n.d.) 	*reliability: low (self-reported sources) *confidence: low to medium <ul style="list-style-type: none"> • Forest reserve outcomes (M/H): need qualification of learning, capacities, and networks • National forest agency outcomes (L): only indication of potential learning • Research outcomes (H) • Community outcomes (H) • Unexpected outcomes (M/H): forest reserve manager-related 	N	<i>Outcome level:</i> Practice and research influence assessed <i>Impact level:</i> Not quantifiable, particularly considering resource constraints

Timber Markets in Sub-Saharan Africa Cluster

Project	Evidence Sources	Level of Outcome Evidence (L, M, H), Reliability Assessment, & Confidence	Impact Estimations in Documentation Existing (Y/N) & Reliability Assessment	Further assessment in this study?
To take stock of community forestry enterprises involved in commercialization of timber in Africa (<i>CIFOR</i>) <ul style="list-style-type: none"> • Cameroon • Gabon • DRC 	<ul style="list-style-type: none"> • 1 final report (2015) • 1 proposal/grant contract (n.d.) 	*reliability: low (self-reported sources) *confidence: low No outcome evidence (only reports on outputs)	N	<i>Outcome level:</i> Assessed for policy and research influence <i>Impact level:</i> Not quantifiable, particularly considering resource constraints
Development of Intra-African Trade and Further	<ul style="list-style-type: none"> • 1 interim project report (2016) 	*reliability: low (self-reported sources) *confidence: low	N	<i>Outcome level:</i> Not assessable <i>Impact level:</i> Not quantifiable

FTA Outcome Assessment and Impact Estimation: Challenge 1 (Deforestation and Forest Degradation)

<p>Processing in Tropical Timber and Timber Products – Phase I (CIFOR)</p> <ul style="list-style-type: none"> Cameroon Cote d'Ivoire DRC 	<ul style="list-style-type: none"> 1 proposal/grant contract (n.d.) 	<p>No outcome evidence (only reports on outputs and intended outcomes)</p>		
<p>DFID KNOWFOR 2: SMEs and Informal Sectors (CIFOR)</p> <ul style="list-style-type: none"> DRC Cameroon Zambia Indonesia 	<ul style="list-style-type: none"> 1 interim report (2017) 1 proposal/grant contract (2016) 	<p>*reliability: low (self-reported sources) *confidence: low</p> <p>No outcome evidence (only reports on outputs and some indications of gov't outcomes and SME outcomes)</p>	N	<p><i>Outcome level:</i> Assessed for policy, practice, and research influence</p> <p><i>Impact level:</i> Not quantifiable, particularly considering resource constraints</p>
<p>Promote and Formalise Artisanal Timber Production in Central Africa (PROFEAAC) (CIFOR)</p> <ul style="list-style-type: none"> Cameroon DRC 	<p>1 presentation (2020) 1 proposal/grant contract (2017) 1 interim report (2020)</p> <p>*New project (too young to evaluate)</p>	<p>No evidence</p>	N	<p><i>Outcome level:</i> Project too young</p> <p><i>Impact level:</i> Not quantifiable</p>

Appendix 4. Evidence Sources

Code	Class	Source	Reference	Date
Gov1	Interview by FTA evaluation	Government respondent	Unpublished interview transcript.	2021
Gov2	Interview by FTA evaluation	Government respondent	Unpublished interview transcript.	2021
Gov3	Previous interview completed by CIFOR	Government respondent	Unpublished interview transcript.	2020
Gov4	Previous interview completed by CIFOR	Government respondent	Unpublished interview transcript.	2020
Gov5	Previous interview completed by CIFOR	Government respondent	Unpublished interview transcript.	2020
Gov6	Interview by FTA evaluation	Government respondent	Unpublished interview transcript.	2021
Gov7	Interview by FTA evaluation	Government respondent	Unpublished interview transcript.	2021
PS1	Interview by FTA evaluation	Private sector respondent	Unpublished interview transcript.	2021
Res1	Interview by FTA evaluation	Researcher respondent	Unpublished interview transcript.	2021
Res2	Interview by FTA evaluation	Researcher respondent	Unpublished interview transcript.	2021



SWAMP Project – Jaring Halus, North Sumatra, Indonesia. Photo by Mokhamad Edliadi/CIFOR.

The CGIAR Research Program on Forests, Trees and Agroforestry (FTA) is the world's largest research for development program to enhance the role of forests, trees and agroforestry in sustainable development and food security and to address climate change. CIFOR leads FTA in partnership with ICRAF, the Alliance of Bioversity International and CIAT, CATIE, CIRAD, INBAR and TBI.

FTA thanks all the donors who supported this research through their contribution to the CGIAR Trust Fund:
cgiar.org/funders/



**RESEARCH
PROGRAM ON
Forests, Trees and
Agroforestry**



foreststreesagroforestry.org



cgiarforestsandtrees@cgiar.org



[@FTA_CGIAR](https://twitter.com/FTA_CGIAR)



[foreststreesagroforestry](https://www.facebook.com/foreststreesagroforestry)