EVIDENCE REVIEW ON FOREST CONSERVATION

Approach paper

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ABBREVIATIONS

AAE	*Asesoramiento Ambiental Estratégico*
3ie	International Initiative for Impact Evaluation
CBD	Convention on Biological Diversity
COP	Conference of the Parties
EGM	Evidence gap map
FAO	Food and Agriculture Organization of the United Nations
FRL	Forest reference level
GCF	Green Climate Fund
GHG	Greenhouse gas
IAE	International accredited entity
ICDP	Integrated conservation and development project
IEU	Independent Evaluation Unit
IPCC	Intergovernmental Panel on Climate Change
ITAP	Independent Technical Advisory Panel
ITTO	International Tropical Timber Organization
LAC	Latin America and the Caribbean
NDCs	Nationally determined contributions
NGO	Non-governmental organization
PAP	Proposal approval process
PES	Payments for environmental services
PICO	Population, intervention, comparator and outcome
RBPs	Results-based payments
REDD+	Reducing Emissions from Deforestation and forest Degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks
RPSP	Readiness and Preparatory Support Programme
SAP	Simplified approval process
SDGs	Sustainable Development Goals
TOC	Theory of change
UNFCCC	United Nations Framework Convention on Climate Change

ABSTRACT

Forest conservation is essential to support the achievement of multiple global goals, including the Paris Agreement, the Kunming-Montreal Global Biodiversity Framework, and the Sustainable Development Goals. Resource allocation for forest conservation is growing, notably through the Green Climate Fund (GCF). Evaluating the effectiveness of forest conservation in developing countries is essential for understanding how conservation efforts contribute to climate mitigation and adaptation, biodiversity protection and environmental sustainability. This approach paper for an evidence gap map (EGM) details the steps and procedures to search, screen, appraise and present the stock of high-quality evidence on interventions, outcomes and impacts of forest conservation measures. The completion of the EGM will show the landscape of evidence on the effectiveness of forest conservation interventions. Based on saturated intervention/outcome cell combinations within the EGM, evidence will be aggregated and reported according to best practice as described in global benchmarks for completing systematic reviews. The completed evidence review will allow the GCF Secretariat and wider stakeholders to enhance the use of evidence in informing policy and practice decisions on forest conservation.

A.   BACKGROUND

The conservation of forests and the reduction of forest degradation and deforestation is a global issue embedded in multiple multilateral environmental agreements and global commitments. Article 5 of the Paris Agreement outlines how Parties to the United Nations Framework Convention on Climate Change (UNFCCC) should take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases (GHGs), including forests.[1] Further, Article 5 outlines how Parties should implement and support, including through results-based payments (RBPs), the existing framework as set out in related guidance and decisions already agreed under the UNFCCC in terms of policy approaches and positive incentives for activities relating to:

- Reducing emissions from deforestation and forest degradation
- The role of conservation
- Sustainable management of forests and enhancement of forest carbon stocks in developing countries
- Alternative policy approaches, such as joint mitigation and adaptation approaches for the integral and sustainable management of forests[2]

At the same time, Article 5 outlines how Parties should implement and support UNFCCC guidance and decisions reaffirming the importance of incentivizing, as appropriate, non-carbon benefits associated with such approaches.

More broadly, within the Convention on Biological Diversity (CBD), forest conservation is gaining importance. Indeed, during the Forest and Water Day at the 16th meeting of the Conference of the Parties to the CBD in 2024, a new report on forests was launched highlighting the importance of the conservation of forest biodiversity and sustainable forest management in achieving the goals and targets of the Kunming-Montreal Global Biodiversity Framework. These aims are deeply rooted in forests and forest sectors (Secretariat of the Convention on Biological Diversity, 2024). The United Nations Convention to Combat Desertification (UNCCD) is a further Rio treaty which engages with

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[1] See UNFCCC (2015), Article 5.
[2] See UNFCCC (2015), Article 5.

land use changes, including deforestation and degradation. Further, goal 15 of the Sustainable Development Goals (SDGs) aims to "protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss".[3]

Within the UNFCCC, the REDD+ mechanism has been particularly important. REDD+ consists of three steps. First, based on the Warsaw Framework, developing countries outline national strategies or action plans, reference levels, monitoring systems and safeguards systems. Second, countries implement these national policies, measures, strategies and action plans, with the aim of reducing emissions from deforestation and forest degradation compared to a baseline reference level. Countries that deliver verified emission reductions can take part in the third stage: namely results-based payment (RBP) funding for further climate action.

Due to the importance of forests, as of 1 May 2021, 47 out of 55 countries that submitted enhanced or updated NDCs to the UNFCCC explicitly mentioned the role of forests in climate action (UN-REDD, 2024). Furthermore, at the 2021 United Nations Climate Change Conference (COP26), the Glasgow Leaders' Declaration on Forests and Land Use committed over 140 countries to work together to halt and reverse forest loss and land degradation by 2030. The declaration includes pledges for substantial funding, with nearly USD 20 billion from public and private sources, to support forest conservation, restoration, and sustainable development, especially in developing countries.

The significance of forests was further illustrated at COP29 in Baku, Azerbaijan, with the launch of the Model Forest Act Initiative. Due to the dearth of legal expertise focused specifically on forests, the Model Forest Act offers forest legislators, activists and advocates a set of legal blueprints that can be utilized in a bespoke manner in specific country contexts and communities. Further, the Model Forest Act Initiative includes resources to improve implementation of forest conservation measures as well as enforcement mechanisms (ADB, 2024). In addition, COP29 saw substantial progress on Article 6.4 of the Paris Agreement, one of the flexibility channels through which climate commitments can be achieved. COP29 saw agreement on the principles for Article 6.4, covering amongst other areas credibility, baselines, data sources, additionality as well as non-permanence and reversals. Furthermore, COP29 saw agreement on associated standards, including on monitoring, reporting, and verification (MRV), accounting, renewals of crediting periods, reversals and notifications (time), leakage (space). Importantly, the standards also included provisions for robust environmental and social safeguards, human rights and the rights of indigenous peoples.

There are also signals that the climate, biodiversity and desertification benefits of forests are now coalescing within the UNFCCC. Both climate and biodiversity conventions are negotiating the drafting of a Tropical Forest Forever Facility (TFFF) which proposes to use satellite monitoring for RBPs with the intention of launching the TFFF at COP30 in Belém, Brazil.

Box 1. Definition of key terms used in this review

The GCF follows the definition of "forest" used by the UNFCCC or the Intergovernmental Panel on Climate Change (IPCC). Specifically, the definition includes thresholds for:

- Tree canopy cover: the minimum percentage of ground covered by tree canopy. Typically, this is set at 10 per cent to 30 per cent
- Minimum land area: The minimum size of land to be classified as a forest. This is generally 0.5

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[3] See Global Goals (n.d.), Goal 15.

hectare to 1 hectare
- Tree height: The potential height trees can reach at maturity, which is usually 2 to 5 metres

For GCF-funded activities, forests are considered land dominated by trees that meet these criteria and exclude lands predominantly under agricultural or urban use (FAO, 2023).[4] The exact thresholds might vary depending on the country-specific forest definitions under their nationally determined contributions (NDCs) or the REDD+ framework, which the GCF often supports.

In the context of the present document, the term "forest conservation" is understood to include the protection and sustainable management of existing forest ecosystems, ensuring they continue to provide ecosystem services, such as carbon storage, biodiversity habitats, and water regulation, while supporting the livelihoods of forest-dependent communities. This can include the restoration of degraded forest ecosystems; however, the definition would not include afforestation, which the FAO defines as the "establishment of forest through planting and/or deliberate seeding on land that, until then, was under a different land use, implies a transformation of land use from non-forest to forest" (FAO, 2023).

Source: See FAO (2023) and IPCC.

The Green Climate Fund (GCF) is the world's largest dedicated climate fund supporting developing countries to reduce their emissions and enhance their ability to respond to climate change in line with the Paris Agreement. The GCF's aim is to support a paradigm shift towards low-emission and climate resilient development pathways in the context of sustainable development (GCF, 2011). This overarching aim translates into GCF programming in the forest and land use sector through:

- Forest protection – Countries recognising the role of forests for mitigation and adaptation in their NDCs need to reflect this pathway in strategic planning instruments at national and local levels.
- Forest restoration – Restoring forested landscapes relies on international and national catalysts for reforestation, and on traditional and indigenous communities' buy-in and leadership.
- Sustainable forest management – Improved forests and forestry management can help to increase carbon sequestration and storage, and to grow resilience, while maintaining economic productivity.

At the end of October 2024, the GCF had an approved project portfolio of USD 15.9 billion, which mobilized co-financing of USD 45.5 billion. The GCF provides Readiness and Preparatory Support Programme (RPSP) resources, and finances forestry projects on both mitigation and adaptation. At this time, 175 RPSP grants had been granted, totalling USD 80 million to USD 105 million for forest-related activities, depending on how you define forests. On the mitigation side, GCF has financed forests and land use projects to the tune of USD 1.66 billion across the simplified approval process (SAP), proposal approval process (PAP) and RBP modalities, encompassing 74 projects. A considerable proportion of this funding came through the GCF's REDD+ modality.

The REDD+ modality was approved in October 2017 and allocated USD 500 million to operationalize REDD+ RBPs and test their procedural and technical elements (GCF IEU, 2024).[5] Eight projects were approved, seven of which were in the Latin America and the Caribbean region as well as Indonesia, through three international accredited entities (IAEs), namely United Nations Development Programme (UNDP), the Food and Agriculture Organization of the United Nations (FAO), and United Nations Environment Programme (UNEP).[6] The eight selected countries

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[4] This is also in line with the definition used by the Food and Agriculture Organization (FAO) of the United Nations in their latest Forest Resources Assessment.
[5] See GCF IEU (2024).
[6] By September 2017, 25 countries had submitted their Forest Reference Levels (FRL), of which the UNFCCC Secretariat had assessed 12.

reinvested REDD+ proceeds in activities aligned with their NDCs, REDD+ strategies, or low-carbon development plans.[7] In this sense, REDD+ RBPs rewarded countries for prior certified reductions in deforestation and degradation.[8]

In July 2024, the GCF Board approved the principles for mainstreaming REDD+ RBPs into the regular project and programme activity cycle of the Fund, as well as, on an exceptional basis, extending the pilot programme on REDD+ RBPs for wider countries.

Given the importance of forest conservation worldwide and the growing funds allocated towards different forest conservation initiatives, including through the GCF and more widely, it becomes imperative to gain an overview of the effectiveness of different types of forest conservation interventions.

B. DESCRIPTION OF THE PROBLEM

Forests in developing countries play a critical role, not only as sources of carbon storage and sequestration, biodiversity and as regulators of global climate patterns, but also as resources for local communities. Land use change, particularly deforestation, contributes up to 20 per cent of global GHG emissions. Deforestation and forest degradation remain significant challenges, often driven by agricultural expansion, logging, infrastructure development, and resource extraction. These pressures are frequently compounded by economic challenges, population growth, and governance issues that make conservation efforts complex and multifaceted.

Assessing the success of forest conservation initiatives depends first and foremost on the objectives set by each initiative. Objectives are typically around forest cover and biodiversity. Increasingly, climate mitigation and adaptation have become key (additional) objectives of forest conservation, through REDD+ schemes or nature-based solutions initiatives. These outcomes can be tracked by indicators such as changes in forest cover, canopy, biodiversity health, carbon storage capacity, occurrence of landslides, or improved water security (Pokharel et al., 2007; ITTO, 2016). Moreover, the success of conservation programmes is increasingly evaluated not just by environmental metrics but also by how well they address the social and economic needs of local communities. Indicators here include income, employment, food security and education (Egan & Estrada-Bustillo, 2011).

In developing countries, where resources for conservation may be limited and alternative land uses may seem more economically appealing to stakeholders in the short term, understanding the effectiveness of these conservation efforts can provide insights into which strategies are most viable, sustainable, and scalable. As common pool resources with opaque and widely misunderstood existing tenure arrangements, forests are subject to the tragedy of the commons whereby benefits from the utilization of resources accrues solely to the user whilst costs are shared across all users.

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[7] The process for selecting countries and allocating payments was as follows. The GCF Secretariat and the independent Technical Advisory Panel (iTAP) assessed financing proposals based on a scoring card on compliance with GCF policies and technical criteria. They included an incentive for full alignments and non-carbon benefits. The payable emission reductions ('GCF ERs volume') were calculated by dividing the total score obtained by the maximum possible score (48 points) and multiplying this by the emission reductions offered by a country. An additional 2.5 per cent of the resulting value was included in the final payment for any country that showed full alignment and non-carbon benefits.

[8] The IEU completed an independent evaluation of the REDD+ modality in June 2024. These highlighted common lessons drawn from the portfolio of REDD+ RBP projects in Latin America and the Caribbean, and perspectives drawn from diverse actors associated with these projects – not project evaluations. It found that the approval process of the REDD+ RBP projects improved over time with refined templates. Whilst the ex-post stipulation of usage of REDD+ RBP proceeds for reinvesting was additional to requirements under the Warsaw Framework, such a requirement did not prevent access but took time. IAEs acted as a conduit for accessing the fund due to their expertise, and worked with local partners involved via framework agreements. The study highlighted the importance of national structures for the devolution of resources, the importance of flexibility in allocation of funds, and showed that long-term benefits were baked into the process through new instruments and institutions (Colombia and Paraguay), MRV (Costa Rica), and structures (Chile).

C. OBJECTIVES OF THE REVIEW

Evidence reviews not only help in identifying successful practices but also aid in refining policies, improving funding allocations, and fostering collaborations. Thus, evidence reviews are highly relevant to the policies and practices of the GCF. There are several types of evidence review, which include evidence gap maps (EGMs), systematic reviews, and meta-analyses. EGMs are tools that a range of actors – such as policy-makers, implementing agencies, funding agencies and evaluators – can use to support evidence-based policy-making and decision-making. Typically, a landscape of studies is selected through applying inclusion and exclusion criteria, database and repository searches, screening, and data extraction. This landscape is then presented on a framework of interventions (y axis) and outcomes (x axis).

Evidence maps often present different study designs using different shapes or colours, allowing for easy interpretation and understanding. Additional characteristics of the intervention or study, such as geographical region, population sub-group or study design can be applied as filters for the map. EGMs facilitate the use of such evidence to inform decisions by making evidence easily accessible. EGMs illustrate the specific intervention/outcome cells that are "saturated", thus allowing meta-analysis to be conducted on identical intervention/outcome combinations. They also identify gaps where the number of studies, evaluations or syntheses is low.

Both systematic reviews and meta-analyses focus on evidence related to a specific intervention. However, they differ in how they treat the data collected in the literature. Systematic reviews offer a narrative synthesis of the issue, while meta-analyses also provide a statistical analysis that combines the results of multiple scientific studies to assess the effect of an intervention. Meta-analyses thus can only be done when a critical mass of statistical studies exist within a broadly similar intervention/outcome area which can be aggregated (such that the increase in sample size improves the precision of estimates of effect sizes at the same time as narrowing confidence intervals).

A comprehensive approach to reviewing the evidence on forest conservation effectiveness can therefore illuminate the challenges and opportunities in balancing ecological preservation with sustainable development, helping policymakers and conservationists in developing countries to create more resilient and equitable conservation strategies.

To support the learning mandate of the Independent Evaluation Unit of the GCF, the objective of this review is first to produce an EGM of the available literature, answering the following overarching question:

- What is the evidence base on the effectiveness of selected forest conservation interventions in developing countries?

With the EGM complete, it will be possible to select intervention/outcome areas that contain sufficient evidence to undertake a systematic review or meta-analysis that answers the following questions:

- To what extent have selected forest conservation interventions been effective at achieving desired outcomes at the individual, household, community, firm and/or landscape levels in developing countries?
- What factors influence the effectiveness of interventions for forest conservation in developing countries?

The evidence review will build on the previous 2019 study completed by the IEU on the Effectiveness of Forest Conservation Interventions: An Evidence Gap Map (Pirad et al., 2019). The evidence review will also be informed by wider forestry EGMs including 3ie's reviews in 2016 on forest conservation (Puri et al., 2016). In addition, the evidence review will be informed by 3ie's

2024 EGM update on land-use change and forestry programmes in low- and middle-income countries (Parrao et al., 2024).

D. METHODS

The EGM and systematic review will be a comprehensive and rigorous collation, assessment, and presentation of evidence (using both peer-reviewed and grey literature) including critical appraisal of the literature. The evidence review will be based on a structured literature search guided by a protocol – an appraisal of the quality of evidence based on clear criteria. It will offer a clear, descriptive and analytical synthesis of the evidence base (as defined below).

1. THE OVERALL REVIEW APPROACH

This study aims to first establish a theory of change (TOC) and then develop the population, intervention, comparator and outcome (PICO) model, drawing from the aforementioned EGMs but also filling in any gaps that might be identified. A theory of change explains how the activities undertaken by an intervention (such as a project, programme or policy) contribute to a chain of results that lead to the intended or observed impacts. Once the EGM framework of interventions and outcomes is established, search requirements, eligibility criteria, and coding procedures will be established (see sections 3 to 5). The articles found will be screened for eligibility and then coded for representation into the EGM framework. The EGM displays the landscape of evidence on the effectiveness of forest conservation interventions. Subsequently, intervention/outcome areas where evidence of the effectiveness of relevant forest conservation interventions is sufficient for a qualitative or quantitative synthesis, will be identified and a systematic review or meta-analysis will be performed. The evidence review will include publications from both peer-reviewed and grey literature.

2. THEORY OF CHANGE

Forest conservation covers a diversity of types and scales of conservation interventions, ranging from tiny integrated community conservation projects to large-scale national strategies, including those that incorporate REDD+ and protected area networks. The review will identify and synthesize the available evidence on deliberate interventions contributing towards forest conservation, specifically in non-annex I countries. A TOC is required that broadly sets out the reasoning, linking inputs and assumptions to outcomes and impacts at varied scales in space and time.

Börner et al. (2020) proposed a TOC on the effectiveness of forest conservation that focuses on theoretical impact channels, economic and institutional requirements for effectiveness, goal trade-offs including through leakage and spill over effects, and behavioural issues. This review project uses this TOC as a basis, with some modifications to the interventions and outcomes.

a. Interventions

The 2019 IEU Forest Conservation EGM contained nine categories of interventions (see appendix I) while the 2024 3ie land use change and forestry programme EGM contained five categories of interventions, four of which are relevant to forest conservation initiatives. Indeed, their fifth category referred to infrastructure interventions that impact land use change, which is not pertinent to forest conservation initiatives. The TOC by Börner et al. (2020) on the other hand classified interventions into three categories (enabling measures, incentives and disincentives). However, these three categories do not adequately describe the types of instruments used by policy-makers. A

better categorization in this instance is that provided by the types of policy instruments (Bengtsson et al., 2010; see Box 2).

Box 2.   Policy instrument types

- **Regulatory instruments**: These involve creating laws, regulations, or rules that set obligations or restrictions on behaviour. For example, environmental standards or protected areas are enforced through legal requirements.
- **Economic instruments**: Governments use financial mechanisms like taxes, subsidies, and incentives to influence behaviour. For instance, carbon markets encourage businesses to reduce emissions, while payments for ecosystem services incentivizes forest protection.
- **Informational instruments**: These aim to educate and inform the public or specific groups about an issue, such as public awareness campaigns on environmental protection. The goal is to influence behaviour through information dissemination.
- **Voluntary instruments**: These include non-binding agreements or partnerships between government, businesses, and other stakeholders to achieve policy objectives. Examples include voluntary environmental agreements or corporate social responsibility initiatives.

Source: Bengtsson et al., 2010.

Figure 1.   Theory of change for the effectiveness of forest conservation
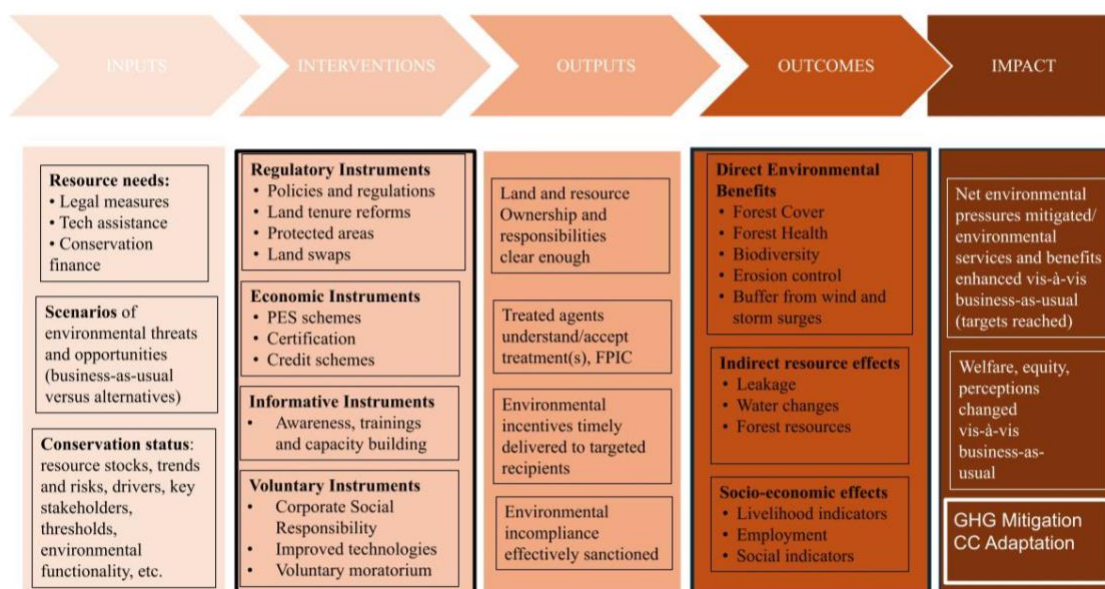
Source: Adapted from Börner et al. (2020).
Note: The bold lines indicate the elements retained for the EGM framework. FPIC = free, prior and informed consent.

The following four categories as seen in Table 1effectively cover those described by both the previous EGMs.

Table 1.   *Intervention categories used by the 3ie and IEU EGMs sorted by the TOC categories*

EGM CATEGORIES	CATEGORIES USED BY 3IE 2024 EGM	CATEGORIES USED BY IEU 2019 EGM
Regulatory instruments	Law and policies related to forests and other land	Improvement based on rule of law
		Land tenure reforms
	Area protection and management	Protected areas
		Intragovernmental deforestation-curbing regulations
		Land swaps
Informative instruments	Training, education and information to promote sustainable practices and technology	Awareness raising and capacity building
		Training on local sustainable practices involving local communities
Voluntary instruments		Indirect conservation based on improved technologies and/or substitution effects
		Zero-deforestation commitments
		Barring non-sustainable providers in value chains
Economic instruments	Incentives	Incentives: PES-like (payments for environmental services) with clear conditionalities
		Certification

Source: Adapted by authors from Puri et al., 2016, Pirard et al. 2019.
Note: Definitions of intervention type, explanations and examples are shown in Table 2.

Table 2.   *Intervention type, explanations and examples*

INTERVENTION TYPE	EXPLANATION (ADJUSTED AND EXTENDED FROM 2019 EGM)
Regulatory instruments	
Policies	Improvements in the rule of law
Land tenure reforms	Land tenure reforms that include conservation objectives, such as transfer of property rights and/or consolidation of tenure security, as in the case of indigenous/local land demarcation and tenure enforcement processes
Protected areas (PA)	Various categories as defined by the International Union for Conservation of Nature (IUCN), based on the degree of protection/tolerance of human presence and activities within its borders
Land swaps	Changes in land designation (e.g. moving a concession from a high conservation value area to a degraded area or an area without forest cover)
Compliance	Intragovernmental deforestation-curbing regulations, such as: • Transfers from central to local government based on conservation performance (e.g. the Brazilian ecological value added tax (ICMS-Ecológico)) • Central Government publicly exposing high-deforesting municipalities ('blacklisting') and cutting their access to credits and subsidies while listed

Informative instruments	
Awareness and capacity building	Activities aiming to create knowledge and behaviour change, including: • Education and awareness campaigns • Training of communities on sustainable methods, etc.
Voluntary instruments	
Corporate social responsibility	Zero-deforestation commitments (reaping publicity gains for consumer recognition of sustainability)
Voluntary use of improved technologies	• Interventions to increase agricultural yields (Borlaug hypothesis of 'land sparing') • Improved cooking stoves • Plantations with clear conservation purposes (e.g. for fuelwood supplies) • Agroforestry with clear conservation purposes • Alternative livelihoods
Voluntary moratorium	Barring non-sustainable providers in value chains
Economic instruments	
PES schemes	• User-financed PES: Private and non-governmental organization interventions such as Coasean agreements • Government-financed PES: Subsidy programmes established by broader public sector institutions or user representatives, often tax financed
Environmental certification	Environmental certification, with consumer-financed sustainability premiums (for forest products, such as the Forest Stewardship Council for timber; or for crops, such as the Roundtable on Sustainable Palm Oil)
Credit schemes and market mechanism	Credit schemes including offsets, biodiversity credits, voluntary and compliance carbon market

Source: Adapted by authors from Puri et al., 2016, Pirard et al. 2019.

b. Outcomes

As for interventions, the outcome definitions in the 2019 EGM were reviewed to assess suitability for the present EGM. Outcomes are not part of the inclusion/exclusion criteria for the study. The 2019 EGM included GHG emissions, biodiversity, forest condition, forest conservation, forest protection, forest cover, reduced deforestation, livelihoods, and employment. The 2019 EGM also included the quality of certain impacts, such as the cost-effectiveness of the intervention (how much positive outcome against the cost of the intervention) and leakage (*vis-à-vis* all previously listed outcomes happening outside of the boundaries of the intervention). The 2019 EGM stated the list of outcomes was not closed and other social outcomes, such as participation, equity, were also considered.

As shown in the TOC, we suggest distinguishing outcomes according to whether they are direct environmental benefits, indirect resource effects, or socio-economic effects (see Table 3). Each of these can be experienced by citizens directly as a result of implementing forest conservation interventions.

Table 3.   Outcome definitions

DIRECT ENVIRONMENTAL BENEFITS

Biodiversity	Forest conservation supports the maintenance, recovery and increase of the diversity of species and ecosystems, and impacts the population sizes and occurrence of species. Indicators include: • Number of species found in the forest • Population sizes of forest species • Return of species that had previously disappeared • Endemic or endangered species protected
Forest cover	Forest cover is conserved or increased, through active conservation, strict protection or natural regeneration. The typical indicator is the area covered by forest.
Forest health	Forest health refers to the condition of forests being resilient to both biotic (such as pests, diseases) and abiotic (for example, climate change, pollution) disturbances while maintaining ecological integrity and capacity to provide essential ecosystem services. These include timber production, carbon sequestration, biodiversity conservation, and supporting livelihoods. Measuring forest health is complex and indicators can vary by forest type. For the tropics, a typical indicator is the amount of post-logging woody debris after timber extraction, because excessive amounts of woody debris leave forests in a highly fire-prone state and provide insect breeding sites (FAO, 2021).
Erosion control	Forests absorb and slow down rainfall, which reduces the risk of flooding and soil erosion, while root systems stabilize the soil, preventing soil loss or even landslides during heavy storms. Indicators include: • Soil erosion rates • Soil compaction • Root density • Presence of vegetation cover
Buffer against wind and storm surges	Forests act as wind shields, dissipating wind energy, and thus protecting nearby communities and infrastructure from wind damage. Coastal forests can mitigate wave power and serve as a buffer against storm surges. Indicators include: • Wind speed reduction • Wave height attenuation • Flooding extent • Soil erosion rates
INDIRECT RESOURCE EFFECTS	
Availability of other forest resources	Forest conservation helps maintain biodiversity, ensuring that various forest resources, such as medicinal plants, timber, and non-timber products, continue to thrive. Continued or enhanced availability of such resources may be seen as an indirect benefit of forest conservation by local people, unless there are access restrictions due to strict protection measures. In that case, while effects for biodiversity are positive, they can be perceived as negative by local resource users. Indicators include: • Population sizes/density of certain species • Time spent looking for certain species/distance to cover before finding certain species • Species returning to forest that were not available anymore • Distance and access to firewood
Leakage	Forest cover loss gets displaced to areas outside of the intervention area (leakage) or gets displaced in time (reversals). The typical indicator would be

	the size of the area displaced or the timeframe.
Water effects	The water cycle and/or resources are influenced by forests, as forests support the maintenance of soil moisture, reduce surface runoff, and enhance groundwater recharge, improving water quality by filtering pollutants and stabilizing streamflow. However, they can sometimes also have negative effects, particularly in areas where invasive species or overgrowth disrupt natural water flows. Additionally, dense forests in certain regions may increase evapotranspiration, potentially reducing local water availability, especially in arid climates. Indicators include: • Groundwater level changes • Water quality indicators • Water availability • Sedimentation and turbidity
SOCIO-ECONOMIC EFFECTS	
Livelihood effects	Forest conservation can affect local livelihoods. Livelihoods refer to the means by which a person or community secures the necessities of life, such as food, shelter, and clothing. It includes income-generating activities, and access to resources that support an individual or family's well-being. Effects can be positive, such as when forest conservation leads to enhanced food security, or can be negative when access to forest resources gets restricted for the sake of forest conservation. Indicators include: • Income or expenditure • Food security indicators such as dietary diversity • Number and diversity of livelihood activities
Employment	Forest conservation can create new job opportunities. Where forest conservation creates eco-tourism infrastructure, this may open opportunities for employment for local people as guides. However, forest conservation can also reduce employment opportunities, where strict protection measures are put in place and enforced, restricting local people from using forest resources. Indicators include: • Number of jobs created • Un-/employment rate
Social effects	Forest conservation can have a range of social effects. All social indicators will be covered. Examples include: • Education • Equity • Participation • Decision-making • Empowerment • Traditional knowledge and practices • Land rights and tenure • Awareness and training

Source: Adapted by authors from Puri et al., 2016, Pirard et al. 2019.

c.   Impact

For the GCF, the effectiveness of forest conservation interventions primarily relates to enhancing climate impacts. In this respect, the review will focus primarily on adaptation to climate change, and

on the reduction or sequestration of carbon dioxide or other GHGs by conserving forests that otherwise would have been degraded or deforested.

Climate mitigation and adaptation could be considered as both an outcome or an impact depending on whether actions were specifically undertaken for mitigation or adaptation purposes, or whether they are cascading or have systemic effects. As mentioned above, forest conservation interventions can have various aims. Within our outcome framework, we have included outcomes on climate adaptation (such as erosion control, buffer from storms, reduced flooding, improved livelihoods). Further, forest cover necessarily equates to carbon sequestration. The review team will assess whether these interventions are additional to business-as-usual development or biodiversity conservation.

3. CRITERIA FOR INCLUSION AND EXCLUSION OF STUDIES IN THE REVIEW

The evidence review will include publications from both peer-reviewed and grey literature. The language proficiency of the selected team determines that the languages included in the scope of the review are in this case English and Spanish.

This evidence review will use the PICO framework to derive the inclusion and exclusion criteria for studies. A summary of the PICOs of this study is presented in Table 4 and further explained below.

Table 4. **PICO framework**

Population	Forest ecosystems in developing countries
Interventions	Policies, programmes or projects that conserve or protect forest ecosystems directly or indirectly
Comparator	Comparable forest ecosystems at sites without the implementation of a forest conservation intervention, or measuring before and after the intervention
Outcomes	Direct environmental benefits resulting from forest conservation along with any indirect resource effects and socio-economic effects

Source: Adapted by authors from Puri et al., 2016, Pirard et al. 2019.

a. Population

The EGM will include:

- **Developing countries**: we refer to developing countries in this context as non-annex I countries as defined by the Kyoto Protocol.
- The evidence review will include studies conducted at different **units of observation**, including households, communities, firms, districts, regions and countries.[9]
- The review will focus on **forest ecosystems** targeted by a forest conservation intervention including terrestrial forest ecosystems, mangroves, and agroforests.

b. Interventions

The EGM will cover all interventions presented in Table 2, where the objective of the intervention is forest conservation. Some interventions, such as land tenure reforms may have not been undertaken with the purpose for forest conservation but achieved that result. While these indirect interventions

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[9] The term "regions" can here be understood as referring to subnational units (e.g. the Brazilian Pantanal) as well as international units (e.g. the Amazon rainforest).

will be coded, they will not be analyzed in more detail for the EGM. Their coding, however, will be helpful in the subsequent analysis that also aims to create a deeper understanding of the factors influencing the effectiveness of forest interventions (moderators) within the subsequent systematic review.

c. Comparator

This review will include studies that evaluate comparable populations (forest ecosystems and/or human populations or firms) at sites without the implementation of a forest conservation intervention or measuring before and after the intervention.

d. Outcomes

This review will cover the outcomes presented in Table 3. Outcome measures will not form part of the criteria for including/excluding studies in the review, and, at a minimum, should cover mitigation and/or adaptation dimensions.

e. Study design

The review will include quantitative or mixed-methods studies published as peer-review articles or as grey literature (documents published by organizations), including the following methodological approaches:

- Impact evaluation approaches, which assess the impact of an intervention using counterfactual analysis (experimental and quasi-experimental approaches)
- Correlation analyses (e.g. using cross-sectional data, panel data or time series)
- Systematic reviews of quantitative evidence studies

f. Exclusion criteria

Table 5 summarises the exclusion criteria used in this review. The study will use the PICO framework and the study type, as well as delineate the inclusion criteria for languages and publication dates.

Table 5.   *Summary of PICO framework and inclusion/exclusion criteria*

	INCLUDE	EXCLUDE
Population	- Developing countries as defined by the Kyoto Protocol - Range of scales including households, communities, firms, districts, regions, and countries - Forest ecosystems targeted by a forest conservation intervention including terrestrial forest ecosystems, mangroves, and agroforests	- Non-forest ecosystems - Areas not targeted by a forest conservation intervention - Countries listed in annex I of the Kyoto Protocol
Interventions	All interventions listed in Table 2	- Interventions not primarily aiming at forest conservation: - Integrated conservation and development projects (ICDPs) when conservation is not stated as the primary objective - No clear boundaries for the population affected by the

		intervention
		• Interventions primarily aiming to address threats to biodiversity, such as wildlife trade, poaching
Comparator	• Comparable populations (forest ecosystems, local households, communities, and companies) at sites without the implementation of forest conservation interventions • Same populations at sites prior to the implementation of forest conservation interventions (before/after comparators) • Comparable populations subject to other forest conservation interventions	• Different ecosystems • Households, communities or companies in areas where non-forest interventions are implemented that could bias the comparison
Outcomes	All interventions listed in Table 3	None
Study	• Quantitative or mixed-methods studies published as peer-review articles or as grey literature (documents published by organizations), including the following methodological approaches: • Impact evaluation approach, which assesses the impact of an intervention using counterfactual analysis (experimental and quasi-experimental approaches) • Correlation analyses (e.g. using cross-sectional data, panel data or time series) • Systematic reviews of quantitative evidence studies	• Process-based evaluation reports (i.e. evaluation reports based on milestone indicators, stakeholder-based evidence and qualitative information) • Prospective and predictive analysis based on modelling • Cost-benefit and cost-effectiveness analysis

Source: Adapted from Puri et al., 2016, Pirard et al. 2019.

4. SEARCHING FOR EVIDENCE

The review will cover both peer-reviewed and grey literature but will exclude book chapters (because these can be challenging to access). The IEU 2019 forest EGM covers the period 1990 to 31 August 2018. Our EGM covers 1990 to the end of 2024. The search will cover English and Spanish language literature.

a. Search databases and repositories

Several peer-review and grey literature databases will be searched:

- Scopus
- 3ie Database
- Environmental Evidence Library (Collaboration for Environmental Evidence Review Database)
- World Bank e-library

A selection of grey literature will be identified by going directly to relevant organization websites informed by the list of relevant sources determined by expert input, such as:

- Center for International Forestry Research (CIFOR) World Agroforestry Centre (ICRAF)
- Mangroves for the Future
- Mangrove Alliance

- The Nature Conservancy
- Ecologic Institute
- Earth-Eval
- Global Environment Facility
- Center for Effective Global Action Research Publications

In addition, specific articles provided by the Advisory Group made up of key experts will be considered. The results from searches will be combined in Zotero and duplicates will be removed.

b.   Forward and backward citation searches

Backward citation searches will be used to find all cited references within systematic reviews and meta-analyses.

c.   Search terms

The search terms from the 2019 EGM will be used with key additions, which are shown in marron red in Table 6. Our search terms will provide broad but manageable coverage related to the EGM objective.

Table 6.   Expanded search terms from the 2019 EGM

INTERVENTIONS
Conservation; protection; sustainable management; protected area; national park; indigenous territory; indigenous reserve; nature reserve; community-based management; forest reserve; community-conserved area; conservation corridor; sanctuary; payment(s) for environmental services; payment(s) for ecosystem services; direct payment(s); incentive(s)-based conservation; subsidies; subsidy program; subsidy programme; extractive reserve(s); indigenous land demarcation; local land demarcation; Rural Environmental Registry; certification; agricultural yield(s); sustainable agriculture; capacity-building; cooking stoves; fuelwood substitution; land-use zoning; nontimber forest product(s); land tenure; titling; law enforcement; rule of law; deforestation-free supply chain; zero-deforestation supply chain; zero-deforestation commitment; tax concession; land swap; moratorium; environmental awareness; capacity building; ICDP;

POPULATION
Forest*; mangrove*; rainforest*; developing countr*; communit*; village*;communit*; district*; sector*; low income countr*; middle income countr*

OUTCOMES
greenhouse gases emissions; GHG emissions; forest condition; forest cover; reduced deforestation; adaptation; flooding; drought; disaster-risk reduction; soil stabilization; erosion control; livelihoods; employment; carbon stock enhancement; buffer; storm surges; coastal protection; leakage; water quality; water quantity; surface runoff; groundwater recharge; water availability; income; poverty reduction; food security; health; education, equity; participation; social; knowledge; behaviour change;

METHODS
empirical evidence; empiric*; impact evaluation; systematic review; statistical analysis; counterfactual; experiment*; quasi-experimental; discontinuity design; discontinuity regression; regression discontinuity; fixed effect*; regression; difference* in difference*; double differenc*; instrumental variable*; propensity score; matching; propensity weight*; time-series; panel data ;double robust; random*; control group; pipeline approach; pipeline method; pipeline comparison ; impact assessment; econometric analys*; cross-sectional data; difference-in-difference

Source: Adapted by authors from Puri et al., 2016, Pirard et al. 2019.
Note: *=wildcard.

Six searches were undertaken (see appendix 1) with several different sets of search terms. Individual search terms use wildcard symbols (*) where appropriate and are separated by Boolean "OR" operators. Sets are combined using "AND". Additionally, an "AND NOT" set was trialled for exclusions.

We will test the robustness of our search using a compilation of benchmark papers. These are papers that we know ought to be in the search results and come from the 3ie 2024 EGM.

d. Screening of studies

After combining search outputs from the different sources and removing duplicates, screening will be undertaken through a stepwise process by applying the primary inclusion and exclusion criteria to:

a)   the article title
b)   the abstract
c)   the full text

Exclusion will be conservative during phases (a) and (b) if there is any doubt the criteria for inclusion or exclusion are being met. Reviewer bias will be tested for at the start of the selection process of step (b) with a Kappa analysis (CEE, 2013). Two reviewers will review a common, random 10 per cent sample of the abstracts. The level of agreement between the number of articles rejected or accepted by the reviewers will be calculated using the Kappa statistic. Values can range from +1 (perfect agreement) to −1 (strong disagreement). During step (c), reasonable effort will be made to secure the relevant articles, contacting authors if necessary.

As it may not be feasible within the time and budget constraints to secure all articles, a list of these will be included in the final report. If reviewers have a disagreement on whether or not to include a document, it will be brought to the engagement committee for arbitration.

5. DATA COLLECTION AND ANALYSIS

The EGM will graphically depict evidence on forest conservation interventions in developing countries in terms of studied interventions and outcomes.

a. Data extraction and management

Included studies will be given an identifier number and will be coded according to the relevant intervention and outcome categories included in the framework. In particular, we will record:

1)   Bibliographical data
   +   Full title of the paper
   +   Authors
   +   Year
   +   Publication type (journal name or acronym, or working paper series name)
   +   Language
2)   Descriptive data
   +   Country and region
   +   Forest type (boreal, temperate, tropical (rain/moist forest, dry forest, mangrove))
   +   Population (national, sub-national, community, indigenous, household)
   +   Interventions
   +   Outcomes
   +   Participation mechanism
   +   Programme mechanism (e.g. research project, funded project, etc.)

+ Programme/study dates

3) Methodological information

+ Study type (review, meta-analysis, qualitative or quantitative study)
+ Comparator
+ Analysis method

EPPI-Reviewer will be used. EPPI-Reviewer is a web-based software program used for managing and analysing data in literature reviews. Two separate reviewers will use the data extraction form with discrepancies reconciled by a third party. Reviewers and the third party will pilot the data extraction tool drawing a random sample of studies, with the aim of achieving 90 per cent alignment before finalizing the tool.

b. Critical appraisal

The process of assessing the methods and results of studies is commonly referred to as critical appraisal. This process generally aims to determine whether the study is adequate for answering evaluation questions. Research evidence can be produced by a wide range of methods and approaches, and some of them, for reasons of cost, practicality, or accident, might be subject to some degree of systematic error (bias). Assessing study quality is understood as an exercise to determine the extent to which a study is free from the main methodological biases (such as selection bias, response bias, attrition bias, or observer bias). Cochrane's risk of bias tool for randomized and non-randomized studies will be used as critical appraisal (Sterne et al., 2016).[10]

This domain-based risk tool covers seven indications of trustworthiness of which this review will use five:

• Selection bias
• Confounding bias
• Bias due to departures from applied interventions
• Bias due to measurement of outcomes
• Bias due to selection of the reported result

Each bias domain receives a low, moderate, high, or critical risk of bias rating, allowing for a transparent calculation of each study's overall bias risk score. Studies with a high likelihood of bias will be included in the review but excluded from the synthesis. If reviewers disagree about the risk-of-bias rating for a particular study, they can consult with a third reviewer.

Furthermore, the studies included will be coded into three categories:

• **Tier 1 category studies** using experimental and quasi-experimental designs to understand causal and attributable impact
• **Tier 2 category studies** using non-causal methods but with comparators
• **Tier 3 category studies** without clearly defined comparators but which provide valuable qualitative context for the effectiveness of forestry-related interventions

c. Data analysis and synthesis

The data will be organized into an EGM framework of interventions and outcomes (see Appendix 2). A report accompanying the EGM will include a bibliography, a brief analysis of the data and main findings of the EGM, as well as recommendations for future studies. The EGM framework will be posted online through the use of EPPI-Mapper.

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[10] Many other risk-of-bias tools are also available (e.g. the GRADE2 framework).

E. CONCLUSION

Evidence and gap maps are tools that a range of actors – such as policy-makers, implementing agencies, funding agencies and evaluators – can use to support evidence-based policy making and decision-making. EGMs present evidence neutrally and provide no explanatory power on the effect size of interventions. For this, further meta-analyses or reviews of mapped articles will be necessary. To this end, we will examine the completed EGM for interventions and associated outcomes which contain sufficient evidence to warrant further investigation. The quality and comparability of data will dictate the feasibility of a subsequent meta-analysis or review. A meta-analysis requires comparable quantitative data where effect sizes can be compared. A review, whether systematic or not, allows for a broader analysis regardless of the data type. Once either a meta-analysis or systematic review is decided upon, an additional protocol will be completed that includes a description of the methodology that will be used, including how to deal with effect size calculations and/or the narrative synthesis.

APPENDICES

Appendix 1.   SEARCH TRIALS

No	Search string	Number of hits in Scopus August 2028 – November 2024	Sets and changes to syntax
1	TITLE-ABS-KEY (= (Forest* OR mangrove* OR rainforest*) AND ("developing countr*" OR communit* OR village* OR communit* OR district* OR sector* OR "low income countr*" OR "middle income countr*") OR TITLE-ABS-KEY= (Conservation OR protection OR management) AND ("protected area" OR "national park"; OR "indigenous territory" OR "indigenous reserve" OR "nature reserve" OR "forest reserve" OR sanctuary OR "conservation corridor" OR "extractive reserve") OR ("community-based management" OR "community-conserved area") OR ("payment for environmental services" OR payment for ecosystem services" OR PES OR "direct payment" OR; "incentive-based conservation" OR subsid*) OR ("indigenous land demarcation" OR "local land demarcation" OR "Rural Environmental Registry" OR certification) OR ("agricultural yield" OR "sustainable agriculture" OR "capacity-building" OR "cooking stoves" OR "fuelwood substitution" OR "land-use zoning" OR "nontimber forest product" OR "land tenure" OR titling OR "law enforcement" OR "rule of law" OR "deforestation-free supply chain" OR zero-deforestation supply chain" OR "zero-deforestation commitment" OR "tax concession" OR "land swap" OR "moratorium" OR "environmental awareness" OR ICDP) OR TITLE-ABS-KEY =("greenhouse gases emissions" OR "GHG emissions" OR "carbon stock enhancement" OR "forest condition" OR "forest cover" OR "reduced deforestation" OR (adaptation AND flooding) OR (adaptation AND drought) OR "disaster-risk reduction" OR "soil stabilisation" OR "erosion control" OR livelihood* OR employment OR (adaptation AND buffer) OR (Adaptation AND "storm surges") OR coastal protection OR leakage OR ("water quality" OR "water quantity" OR "surface runoff" OR "groundwater recharge" OR "water availability") OR income OR "poverty reduction" OR "food security" OR health OR education OR equity OR participation OR social OR knowledge OR "behaviour change" AND PUBYEAR > 2017 AND PUBYEAR < 2025 AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE , "Spanish"))	265,040 documents found	Population Intervention Outcome

| 2 | TITLE-ABS-KEY= (Forest* OR mangrove* OR rainforest*) AND ("developing countr*" OR communit* OR village* OR communit* OR district* OR sector* OR "low income countr*" OR "middle income countr*")

 OR TITLE-ABS-KEY= (Conservation OR protection OR management) AND ("protected area" OR "national park"; OR "indigenous territory" OR "indigenous reserve" OR "nature reserve" OR "forest reserve" OR sanctuary OR "conservation corridor" OR "extractive reserve") OR ("community-based management" OR "community-conserved area") OR ("payment for environmental services" OR payment for ecosystem services" OR PES OR "direct payment" OR; "incentive-based conservation" OR subsid*) OR ("indigenous land demarcation" OR "local land demarcation" OR "Rural Environmental Registry" OR certification) OR ("agricultural yield" OR "sustainable agriculture" OR "capacity-building" OR "cooking stoves" OR "fuelwood substitution" OR "land-use zoning" OR "nontimber forest product" OR "land tenure" OR titling OR "law enforcement" OR "rule of law" OR "deforestation-free supply chain" OR zero-deforestation supply chain" OR "zero-deforestation commitment" OR "tax concession" OR "land swap" OR "moratorium" OR "environmental awareness" OR ICDP)

 OR TITLE-ABS-KEY= ("greenhouse gases emissions" OR "GHG emissions" OR "carbon stock enhancement" OR "forest condition" OR "forest cover" OR "reduced deforestation" OR (adaptation AND flooding) OR (adaptation AND drought) OR "disaster-risk reduction" OR "soil stabilisation" OR "erosion control" OR livelihood* OR employment OR (adaptation AND buffer) OR (Adaptation AND "storm surges") OR coastal protection OR leakage OR ("water quality" OR "water quantity" OR "surface runoff" OR "groundwater recharge" OR "water availability") OR income OR "poverty reduction" OR "food security" OR health OR education OR equity OR participation OR social OR knowledge OR "behaviour change".

 AND TITLE-ABS-KEY= ("empirical evidence" OR empiric* OR "impact evaluation" OR "systematic review" OR "statistical analysis" OR counterfactual OR experiment* OR "quasi-experimental" OR "discontinuity design" OR "discontinuity regression" OR "regression discontinuity" OR "fixed effect*" OR regression OR "difference* in difference*" OR "double differenc*" OR "instrumental variable*" OR "propensity score" OR matching OR "propensity weight*" OR "time-series" OR "panel data" OR "double robust" OR random* OR "control group" OR "pipeline approach" OR "pipeline method" OR "pipeline comparison" OR "impact assessment" OR "econometric analys*" OR "cross-sectional data" OR "difference-in-difference")

 AND PUBYEAR > 2017 AND PUBYEAR < 2025 AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE , "Spanish")) | 75,888 documents found | Added

 Method |
| 3 | TITLE-ABS-KEY= (Forest* OR mangrove* OR rainforest*) | 23,636 documents | Added |

	found	Exclusion (geographical)
AND TITLE-ABS-KEY= ("developing countr*" OR communit* OR village* OR communit* OR district* OR sector* OR "low income countr*" OR "middle income countr*")		
OR TITLE-ABS-KEY= (Conservation OR protection OR management) AND ("protected area" OR "national park"; OR "indigenous territory" OR "indigenous reserve" OR "nature reserve" OR "forest reserve" OR sanctuary OR "conservation corridor" OR "extractive reserve") OR ("community-based management" OR "community-conserved area") OR ("payment for environmental services" OR payment for ecosystem services" OR PES OR "direct payment" OR; "incentive-based conservation" OR subsid*) OR ("indigenous land demarcation" OR "local land demarcation" OR "Rural Environmental Registry" OR certification) OR ("agricultural yield" OR "sustainable agriculture" OR "capacity-building" OR "cooking stoves" OR "fuelwood substitution" OR "land-use zoning" OR "nontimber forest product" OR "land tenure" OR titling OR "law enforcement" OR "rule of law" OR "deforestation-free supply chain" OR zero-deforestation supply chain" OR "zero-deforestation commitment" OR "tax concession" OR "land swap" OR "moratorium" OR "environmental awareness" OR ICDP)		
OR TITLE-ABS-KEY= ("greenhouse gases emissions" OR "GHG emissions" OR "carbon stock enhancement" OR "forest condition" OR "forest cover" OR "reduced deforestation" OR (adaptation AND flooding) OR (adaptation AND drought) OR "disaster-risk reduction" OR "soil stabilisation" OR "erosion control" OR livelihood* OR employment OR (adaptation AND buffer) OR (Adaptation AND "storm surges") OR coastal protection OR leakage OR ("water quality" OR "water quantity" OR "surface runoff" OR "groundwater recharge" OR "water availability") OR income OR "poverty reduction" OR "food security" OR health OR education OR equity OR participation OR social OR knowledge OR "behaviour change".		
AND TITLE-ABS-KEY= ("empirical evidence" OR empiric* OR "impact evaluation" OR "systematic review" OR "statistical analysis" OR counterfactual OR experiment* OR "quasi-experimental" OR "discontinuity design" OR "discontinuity regression" OR "regression discontinuity" OR "fixed effect*" OR regression OR "difference* in difference*" OR "double differenc*" OR "instrumental variable*" OR "propensity score" OR matching OR "propensity weight*" OR "time-series" OR "panel data" OR "double robust" OR random* OR "control group" OR "pipeline approach" OR "pipeline method" OR "pipeline comparison" OR "impact assessment" OR "econometric analys*" OR "cross-sectional data" OR "difference-in-difference")		
AND NOT TITLE-ABS-KEY= (US OR USA OR "United states" OR "North America*" OR Alabama OR Alaska OR Arizona OR Arkansas OR California OR Colorado OR Connecticut OR Delaware OR Florida OR Hawaii OR Idaho OR Illinois OR		

	Indiana OR Iowa OR Kansas OR Kentucky OR Louisiana OR Maine OR Maryland OR Massachusetts OR Michigan OR Minnesota OR Mississippi OR Missouri OR Montana OR Nebraska OR Nevada OR "New Hampshire" OR "New Jersey" OR "New Mexico" OR "New York" OR "North Carolina" OR "North Dakota" Ohio OR Oklahoma OR Oregon OR Pennsylvania OR "Rhode Island" OR "South Carolina" "South Dakota" OR Tennessee OR Texas Utah OR Vermont OR Virginia OR Washington OR "West Virginia" OR Wisconsin OR Wyoming OR Canad* OR UK OR England OR Scotland OR Wales OR Ireland OR Irish OR Spain OR France OR Greece OR Ital* OR Portug* OR German* OR Switzerland OR Swiss OR "New Zeal*" OR Australia* OR Israel* OR Belgi* OR Netherland* OR "Dutch" OR Luxemb* OR Denmark OR Norway OR Sweden OR Finland OR Iceland* OR Poland OR Austria* OR Malta OR Hungar* OR Czech OR Slovak* OR Latvia OR Lithuania OR Estonia OR Russia* OR Romania* OR Bulgaria* OR Serbia OR Croatia OR Japan* OR Korea* OR "Hong Kong" OR Singapore OR Saudi Arabia OR Qatar OR Emirates) AND PUBYEAR > 2017 AND PUBYEAR < 2025 AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE , "Spanish"))		
4	TITLE-ABS-KEY= (Forest* OR mangrove* OR rainforest*) AND ("forest protection" OR "forest restoration" OR "forest conservation" OR "reforestation" OR "sustainable forest management") AND TITLE-ABS-KEY= ("developing countr*" OR communit* OR village* OR communit* OR district* OR sector* OR "low income countr*" OR "middle income countr*") OR TITLE-ABS-KEY= (Conservation OR protection OR management) AND ("protected area" OR "national park"; OR "indigenous territory" OR "indigenous reserve" OR "nature reserve" OR "forest reserve" OR sanctuary OR "conservation corridor" OR "extractive reserve") OR ("community-based management" OR "community-conserved area") OR ("payment for environmental services" OR payment for ecosystem services" OR PES OR "direct payment" OR; "incentive-based conservation" OR subsid*) OR ("indigenous land demarcation" OR "local land demarcation" OR "Rural Environmental Registry" OR certification) OR ("agricultural yield" OR "sustainable agriculture" OR "capacity-building" OR "cooking stoves" OR "fuelwood substitution" OR "land-use zoning" OR "nontimber forest product" OR "land tenure" OR titling OR "law enforcement" OR "rule of law" OR "deforestation-free supply chain" OR zero-deforestation supply chain" OR "zero-deforestation commitment" OR "tax concession" OR "land swap" OR "moratorium" OR "environmental awareness" OR ICDP) OR TITLE-ABS-KEY= ("greenhouse gases emissions" OR "GHG emissions" OR "carbon stock enhancement" OR "forest condition" OR "forest cover" OR "reduced deforestation" OR (adaptation AND flooding) OR (adaptation AND drought) OR	1,193 documents found	Added AND ("forest protection" OR "forest restoration" OR "forest conservation" OR "reforestation" OR "sustainable forest management")

"disaster-risk reduction" OR "soil stabilisation" OR "erosion control" OR livelihood* OR employment OR (adaptation AND buffer) OR (Adaptation AND "storm surges")) OR coastal protection OR leakage OR ("water quality" OR "water quantity" OR "surface runoff" OR "groundwater recharge" OR "water availability") OR income OR "poverty reduction" OR "food security" OR health OR education OR equity OR participation OR social OR knowledge OR "behaviour change".

AND TITLE-ABS-KEY= ("empirical evidence" OR empiric* OR "impact evaluation" OR "systematic review" OR "statistical analysis" OR counterfactual OR experiment* OR "quasi-experimental" OR "discontinuity design" OR "discontinuity regression" OR "regression discontinuity" OR "fixed effect*" OR regression OR "difference* in difference*" OR "double differenc*" OR "instrumental variable*" OR "propensity score" OR matching OR "propensity weight*" OR "time-series" OR "panel data" OR "double robust" OR random* OR "control group" OR "pipeline approach" OR "pipeline method" OR "pipeline comparison" OR "impact assessment" OR "econometric analys*" OR "cross-sectional data" OR "difference-in-difference")

AND NOT TITLE-ABS-KEY= (US OR USA OR "United states" OR "North America*" OR Alabama OR Alaska OR Arizona OR Arkansas OR California OR Colorado OR Connecticut OR Delaware OR Florida OR Hawaii OR Idaho OR Illinois OR Indiana OR Iowa OR Kansas OR Kentucky OR Louisiana OR Maine OR Maryland OR Massachusetts OR Michigan OR Minnesota OR Mississippi OR Missouri OR Montana OR Nebraska OR Nevada OR "New Hampshire" OR "New Jersey" OR "New Mexico" OR "New York" OR "North Carolina" OR "North Dakota" Ohio OR Oklahoma OR Oregon OR Pennsylvania OR "Rhode Island" OR "South Carolina" "South Dakota" OR Tennessee OR Texas Utah OR Vermont OR Virginia OR Washington OR "West Virginia" OR Wisconsin OR Wyoming OR Canad* OR UK OR England OR Scotland OR Wales OR Ireland OR Irish OR Spain OR France OR Greece OR Ital* OR Portug* OR German* OR Switzerland OR Swiss OR "New Zeal*" OR Australia* OR Israel* OR Belgi* OR Netherland* OR "Dutch" OR Luxemb* OR Denmark OR Norway OR Sweden OR Finland OR Iceland* OR Poland OR Austria* OR Malta OR Hungar* OR Czech OR Slovak* OR Latvia OR Lithuania OR Estonia OR Russia* OR Romania* OR Bulgaria* OR Serbia OR Croatia OR Japan* OR Korea* OR "Hong Kong" OR Singapore OR Saudi Arabia OR Qatar OR Emirates)

AND PUBYEAR > 2017 AND PUBYEAR < 2025 AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE , "Spanish"))

5	TITLE-ABS-KEY= (Forest* OR mangrove* OR rainforest*) AND ("forest protection" OR "forest restoration" OR "forest conservation" OR "reforestation" OR "sustainable forest management")	4,939 documents found	Method not included

AND TITLE-ABS-KEY= ("developing countr*" OR communit* OR village* OR communit* OR district* OR sector* OR "low income countr*" OR "middle income countr*")

OR TITLE-ABS-KEY= ("greenhouse gases emissions" OR "GHG emissions" OR "carbon stock enhancement" OR "forest condition" OR "forest cover" OR "reduced deforestation" OR (adaptation AND flooding) OR (adaptation AND drought) OR "disaster-risk reduction" OR "soil stabilisation" OR "erosion control" OR livelihood* OR employment OR (adaptation AND buffer) OR (Adaptation AND "storm surges") OR coastal protection OR leakage OR ("water quality" OR "water quantity" OR "surface runoff" OR "groundwater recharge" OR "water availability") OR income OR "poverty reduction" OR "food security" OR health OR education OR equity OR participation OR social OR knowledge OR "behaviour change".

OR TITLE-ABS-KEY= (Conservation OR protection OR management) AND ("protected area" OR "national park"; OR "indigenous territory" OR "indigenous reserve" OR "nature reserve" OR "forest reserve" OR sanctuary OR "conservation corridor" OR "extractive reserve") OR ("community-based management" OR "community-conserved area") OR ("payment for environmental services" OR payment for ecosystem services" OR PES OR "direct payment" OR; "incentive-based conservation" OR subsid*) OR ("indigenous land demarcation" OR "local land demarcation" OR "Rural Environmental Registry" OR certification) OR ("agricultural yield" OR "sustainable agriculture" OR "capacity-building" OR "cooking stoves" OR "fuelwood substitution" OR "land-use zoning" OR "nontimber forest product" OR "land tenure" OR titling OR "law enforcement" OR "rule of law" OR "deforestation-free supply chain" OR zero-deforestation supply chain" OR "zero-deforestation commitment" OR "tax concession" OR "land swap" OR "moratorium" OR "environmental awareness" OR ICDP)

AND NOT TITLE-ABS-KEY= (US OR USA OR "United states" OR "North America*" OR Alabama OR Alaska OR Arizona OR Arkansas OR California OR Colorado OR Connecticut OR Delaware OR Florida OR Hawaii OR Idaho OR Illinois OR Indiana OR Iowa OR Kansas OR Kentucky OR Louisiana OR Maine OR Maryland OR Massachusetts OR Michigan OR Minnesota OR Mississippi OR Missouri OR Montana OR Nebraska OR Nevada OR "New Hampshire" OR "New Jersey" OR "New Mexico" OR "New York" OR "North Carolina" OR "North Dakota" Ohio OR Oklahoma OR Oregon OR Pennsylvania OR "Rhode Island" OR "South Carolina" "South Dakota" OR Tennessee OR Texas Utah OR Vermont OR Virginia OR Washington OR "West Virginia" OR Wisconsin OR Wyoming OR Canad* OR UK OR England OR Scotland OR Wales OR Ireland OR Irish OR Spain OR France OR Greece OR Ital* OR Portug* OR German* OR Switzerland OR Swiss OR "New Zeal*" OR Australia* OR Israel* OR Belgi* OR Netherland* OR "Dutch" OR Luxemb* OR Denmark OR Norway OR Sweden OR Finland OR Iceland* OR Poland OR Austria* OR Malta OR Hungar* OR Czech OR Slovak* OR Latvia OR Lithuania OR Estonia OR Russia* OR Romania* OR Bulgaria* OR Serbia OR Croatia OR Japan* OR Korea* OR "Hong Kong" OR

	Singapore OR Saudi Arabia OR Qatar OR Emirates) AND PUBYEAR > 2017 AND PUBYEAR < 2025 AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE, "Spanish"))		
6	TITLE-ABS-KEY= (Forest* OR mangrove* OR rainforest*) AND ("forest protection" OR "forest restoration" OR "forest conservation" OR "reforestation" OR "sustainable forest management") AND TITLE-ABS-KEY= ("developing countr*" OR communit* OR village* OR communit* OR district* OR sector* OR "low income countr*" OR "middle income countr*") OR TITLE-ABS-KEY= ("greenhouse gases emissions" OR "GHG emissions" OR "carbon stock enhancement" OR "forest condition" OR "forest cover" OR "reduced deforestation" OR (adaptation AND flooding) OR (adaptation AND drought) OR "disaster-risk reduction" OR "soil stabilisation" OR "erosion control" OR livelihood* OR employment OR (adaptation AND buffer) OR (Adaptation AND "storm surges") OR coastal protection OR leakage OR ("water quality" OR "water quantity" OR "surface runoff" OR "groundwater recharge" OR "water availability") OR income OR "poverty reduction" OR "food security" OR health OR education OR equity OR participation OR social OR knowledge OR "behaviour change". OR TITLE-ABS-KEY= (Conservation OR protection OR management) AND ("protected area" OR "national park"; OR "indigenous territory" OR "indigenous reserve" OR "nature reserve" OR "forest reserve" OR sanctuary OR "conservation corridor" OR "extractive reserve") OR ("community-based management" OR "community-conserved area") OR ("payment for environmental services" OR payment for ecosystem services" OR PES OR "direct payment" OR; "incentive-based conservation" OR subsid*) OR ("indigenous land demarcation" OR "local land demarcation" OR "Rural Environmental Registry" OR certification) OR ("agricultural yield" OR "sustainable agriculture" OR "capacity-building" OR "cooking stoves" OR "fuelwood substitution" OR "land-use zoning" OR "nontimber forest product" OR "land tenure" OR titling OR "law enforcement" OR "rule of law" OR "deforestation-free supply chain" OR zero-deforestation supply chain" OR "zero-deforestation commitment" OR "tax concession" OR "land swap" OR "moratorium" OR "environmental awareness" OR ICDP) AND NOT TITLE-ABS-KEY= (US OR USA OR "United states" OR "North America*" OR Alabama OR Alaska OR Arizona OR Arkansas OR California OR Colorado OR Connecticut OR Delaware OR Florida OR Hawaii OR Idaho OR Illinois OR Indiana OR Iowa OR Kansas OR Kentucky OR Louisiana OR Maine OR Maryland OR Massachusetts OR Michigan OR	3,582 documents found	Added filter by subject area, document type and keyword.

Minnesota OR Mississippi OR Missouri OR Montana OR Nebraska OR Nevada OR "New Hampshire" OR "New Jersey" OR "New Mexico" OR "New York" OR "North Carolina" OR "North Dakota" Ohio OR Oklahoma OR Oregon OR Pennsylvania OR "Rhode Island" OR "South Carolina" "South Dakota" OR Tennessee OR Texas Utah OR Vermont OR Virginia OR Washington OR "West Virginia" OR Wisconsin OR Wyoming OR Canad* OR UK OR England OR Scotland OR Wales OR Ireland OR Irish OR Spain OR France OR Greece OR Ital* OR Portug* OR German* OR Switzerland OR Swiss OR "New Zeal*" OR Australia* OR Israel* OR Belgi* OR Netherland* OR "Dutch" OR Luxemb* OR Denmark OR Norway OR Sweden OR Finland OR Iceland* OR Poland OR Austria* OR Malta OR Hungar* OR Czech OR Slovak* OR Latvia OR Lithuania OR Estonia OR Russia* OR Romania* OR Bulgaria* OR Serbia OR Croatia OR Japan* OR Korea* OR "Hong Kong" OR Singapore OR Saudi Arabia OR Qatar OR Emirates)

 AND PUBYEAR > 2017 AND PUBYEAR < 2025 AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE , "Spanish")) AND (EXCLUDE (EXACTKEYWORD , "Microbial Community") OR EXCLUDE (EXACTKEYWORD , "Fungi") OR EXCLUDE (EXACTKEYWORD , "Seed") OR EXCLUDE (EXACTKEYWORD , "Seedling") OR EXCLUDE (EXACTKEYWORD , "Fungus") OR EXCLUDE (EXACTKEYWORD , "Soil Microorganism") OR EXCLUDE (EXACTKEYWORD , "Soil Moisture") OR EXCLUDE (EXACTKEYWORD , "Bacteria") OR EXCLUDE (EXACTKEYWORD , "Soil Property")) AND (LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "ch")) AND (EXCLUDE (SUBJAREA , "BIOC") OR EXCLUDE (SUBJAREA , "MEDI") OR EXCLUDE (SUBJAREA , "BUSI") OR EXCLUDE (SUBJAREA , "ARTS") OR EXCLUDE (SUBJAREA , "IMMU") OR EXCLUDE (SUBJAREA , "PHYS") OR EXCLUDE (SUBJAREA , "MATH") OR EXCLUDE (SUBJAREA , "CHEM") OR EXCLUDE (SUBJAREA , "PHAR") OR EXCLUDE (SUBJAREA , "NEUR") OR EXCLUDE (SUBJAREA , "PSYC") OR EXCLUDE (SUBJAREA , "VETE") OR EXCLUDE (SUBJAREA , "HEAL") OR EXCLUDE (SUBJAREA , "DENT") OR EXCLUDE (SUBJAREA , "MATE") OR EXCLUDE (SUBJAREA , "CENG"))

Appendix 2.   EGM FRAMEWORK

		DIRECT ENVIRONMENTAL BENEFITS					INDIRECT RESOURCE EFFECTS			SOCIO-ECONOMIC EFFECTS			IMPACT	
		Forest cover	Forest health	Biodiversity	Erosion control	Buffer	Leakage	Forest resource change	Water changes	Livelihood	Employment	Social effects	CC adaptation	CC mitigation
Regulatory instruments	Policies													
	Land tenure reforms													
	Protected areas (PA)													
	Land swaps													
	Compliance													
Informative instruments	Awareness and capacity building													
Voluntary instruments	Corporate social responsibility													
	Improved technologies													
	Voluntary moratorium													
Economic instruments	PES schemes													
	Certification													
	Credit schemes and market mechanism													

REFERENCES

ADB (2024). "The Model Forest Act Initiative (MoFAI)." Available at https://lpr.adb.org/program/mofai

Börner, J., Schulz, D., Wunder, S., & Pfaff, A. (2020). "The effectiveness of forest conservation policies and programs." Annual Review of Resource Economics, 12:19.1–19.20.

CEE (2013). "Guidelines for Systematic Review and Evidence Synthesis in Environmental Management." Version 4.2. Environmental Evidence.

Egan, A. and V. Estrada-Bustillo (2011). "Socioeconomic indicators for forest restoration projects." New Mexico Forest and Watershed Restoration Institute, New Mexico Highlands University, Las Vegas, NM.

FAO (2021). "Forest health. Overview." Available at https://www.fao.org/forestry-fao/pests/99464/en/.

FAO (2023). "Terms and Definitions." FRA 2025. Forest Resources Assessment Working Paper 194. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy.

GCF (2011). "Governing Instrument." December. Available at https://www.greenclimate.fund/document/governing-instrument.

GCF IEU (2024). "Special Study on REDD+ Results-Based Payment Projects in the Latin America and Caribbean Region." Green Climate Fund Independent Evaluation Unit. Available at https://ieu.greenclimate.fund/sites/default/files/document/redd-special-study-120824.pdf.

Global Goals (n.d.). "The 17 Goals." Available at https://www.globalgoals.org/goals/.

ITTO (2016). "Criteria and indicators for the sustainable management of tropical forests." ITTO Policy Development Series No. 21. International Tropical Timber Organization, Yokohama, Japan.

IUCN (2017). "The Bonn Challenge and the Paris Agreement: How can forest landscape restoration advance Nationally Determined Contributions?" Forest brief, n°21. IUCN, Switzerland.

Pirard, R., Wunder, S., Duchelle, A.E., Puri, J., Asfaw, S., Bulusu, M., Petit, H., & Vedoveto, M. (2019). "Effectiveness of forest conservation interventions: An evidence gap map." IEU Learning Paper No.2, 2019. Green Climate Fund. Songdo, South Korea.

Parrao, C.G., Yavuz, C., Pande, S., Marion, P., Bhattacharya, M., Ravat, Z., Nabi, A., Floridi, A.,

Berretta, M., Lwamba, E., Storhaug, I., Engelbert, M., Nduku, P., Madonsela, A., Snilstveit, B. (2024). "Land-use change and forestry programmes in low-and middle-income countries: an evidence gap map update." 3ie Evidence Gap Map Report 29. New Delhi: International Initiative for Impact Evaluation (3ie).

Pokharel, Ridish & Suvedi, Murari (2007). "Indicators for Measuring the Success of Nepal's Community Forestry Program: A Local Perspective." Human Ecology Review. 14.

Puri, J., Nath, M., Bhatia, R. & Glew, L. (2016). "Examining the evidence-base for forest conservation interventions, Evidence Gap Map Report 4." International Initiative for Impact Evaluation (3ie). New Delhi.

Saran, A. & White, H. (2018). "Evidence and gap maps: a comparison of different approaches." Campbell Systematic Reviews, 14, 1-38.

Secretariat of the Convention on Biological Diversity (2024). "The Forest Factor: The role of protection, restoration and sustainable management of forests for the implementation of the Kunming-Montreal Global Biodiversity Framework."

Sterne, J., et al. (2016). "ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions." BMJ 2016; 355:i4919

UNFCCC (2015). "The Paris Agreement." Paris Climate Change Conference - November 2015. Available at https://unfccc.int/process/conferences/pastconferences/paris-climate-change-conference-november-2015/paris-agreement

UNFCCC (2016). "Decision booklet REDD+: Key decisions relevant for reducing emissions from deforestation and forest degradation in developing countries (REDD+)."

UN-REDD (2024). "Work areas: NDC forest ambitions." Available at https://www.un-redd.org/work-areas/ndc-forest-ambitions#:~:text=Many%20countries%20refer%20in%20their,to%20the%20UNFCCC%20mention%20forests