Independent Commission for Aid Impact

# International Climate Finance: UK aid for halting deforestation and preventing irreversible biodiversity loss

Literature review

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# Abbreviations

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| **ACB** | ASEAN Centre for Biodiversity |
| **ACTO** | Amazon Cooperation Treaty Organization |
| **AfDB** | African Development Bank |
| **AHP** | ASEAN Heritage Parks programme |
| **ASEAN** | Association of Southeast Asian Nations |
| **B4L** | Biodiversity for Life programme |
| **BAU** | Business as usual |
| **BESA++** | Biodiversity and Ecosystem Services Assessment and Economic Analysis for Management Policy and Innovative Financing Applications |
| **CBD** | Convention on Biological Diversity |
| **CBFF** | Congo Basin Forest Fund |
| **CBFP** | Congo Basin Forest Partnership |
| **CBNRM** | Community-based natural resource management |
| **CDM** | Clean Development Mechanism |
| **CEM** | Commission on Ecosystem Management |
| **CEP** | Climate and Energy programme |
| **CFI** | Cocoa and Forests Initiative |
| **CHM** | Common heritage of mankind |
| **CIF** | Climate Investment Funds |
| **CITES** | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| **COP** | Conference of the Parties |
| **COMIFAC** | Commission des Forêts d'Afrique Centrale |
| **CRS** | Creditor Reporting Systems - OECD Statistics |
| **CSO** | Civil society organisation |
| **DAC** | Development Assistance Committee |
| **DGM** | Dedicated Grant Mechanism for Indigenous Peoples and Local Communities |
| **ECCAS** | Economic Community of Central African States |
| **EICDGB** | Colombia's Comprehensive Strategy for Deforestation Control and Forest Management |
| **ESG** | Environment, social and governance |
| **ETS** | Emissions Trading System |
| **EU** | European Union |
| **FAO** | Food and Agriculture Organization |
| **FCPF** | Forest Carbon Partnership Facility |
| **FILAC** | Fund for the Development of Indigenous Peoples of Latin America and the Caribbean |
| **FIP** | Forest Investment Program |
| **FLEGT** | Forest Law Enforcement, Governance and Trade |
| **FRA** | Global Forest Resources Assessment |
| **GCF** | Green Climate Fund |
| **GCFTF** | Governors' Climate and Forests Task Force |
| **GEF** | Global Environment Facility |
| **GHG** | Greenhouse gas |
| **GMO** | Genetically modified organism |
| **GNU** | Germany, Norway and the United Kingdom |

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| **ICF** | International Climate Finance |
| **IGES** | Institute for Global Environmental Strategies |
| **IGP** | Institutions and Governance Programme |
| **IPBES** | Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services |
| **IPCC** | Intergovernmental Panel on Climate Change |
| **IUCN** | International Union for Conservation of Nature |
| **ITTO** | Tropical Forest Alliance and the International Tropical Timber Organization |
| **LRA** | Local and Regional Authorities |
| **LULUCF** | Land use, land-use change and forestry |
| **MEP** | Markets and Enterprise Programme |
| **MFSC** | Ministry of Forest and Soil Conservation of Nepal |
| **NbS** | Nature-based Solutions |
| **NDC** | Nationally determined contributions |
| **NGO** | Non-governmental organisation |
| **ODA** | Official development assistance |
| **OECD** | Organisation for Economic Co-operation and Development |
| **P4F** | Partnerships for Forests |
| **PCAB** | Partnership for the Conservation of Amazon Biodiversity |
| **PES** | Payments for Ecosystem Services |
| **PRI** | UN's Principles for Responsible Investment |
| **PSSA** | Private Sector Set Asides |
| **RAKB** | Sustainable Finance Action Plan (Indonesia) |
| **RED** | Reducing emissions from deforestation |
| **REDD+** | Reducing emissions from deforestation and forest degradation |
| **RSPO** | Roundtable on Sustainable Palm Oil |
| **SADC** | Southern African Development Community |
| **SDG** | Sustainable Development Goal |
| **TEEB** | The Economics of Ecosystems and Biodiversity |
| **TFA** | Tropical Forest Alliance |
| **UKSIF** | UK Sustainable Investment and Finance Association |
| **UN** | United Nations |
| **UNCCD** | United Nations Convention to Combat Desertification |
| **UNCED** | United Nations Conference on Environment and Development |
| **UNEP** | United Nations Environment Programme |
| **UNFCCC** | United Nations Framework Convention on Climate Change |
| **UNFF** | United Nations Forum on Forests |
| **UNHCR** | United Nations High Commissioner for Refugees |
| **VPA** | Voluntary Partnership Agreements |
| **WEF** | World Economic Forum |
| **WRI** | World Resources Institute |
| **WWF** | World Wildlife Fund |

# Glossary

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|---|---|
| **Afforestation** | Conversion from other land uses into forest. |
| **Anthropogenic threats** | Damage caused by human activities to the environment either directly or indirectly. |
| **Aichi target** | 1992 Convention on Biological Diversity targets set to be achieved by 2020. |
| **Benefit sharing** | Agreement under the Convention on Biological Diversity to ensure fair and equitable sharing of benefits between user and provider countries from the use of genetic resources. |
| **Biodiversity** | Variability among living organisms from all sources and the ecological complexes of which they are part. |
| **Biodiversity finance** | Public and private finance to support sustainable biodiversity. |
| **Biodiversity loss** | Reduction of variability among living organisms including genes due to factors such as overexploitation and climate change. |
| **Carbon sequestration** | One of the methods of reducing the amount of carbon dioxide in the atmosphere by capturing and storing atmospheric carbon dioxide. |
| **Climate change** | Long-term shift in global or regional climate patterns. |
| **Climate finance** | Public, private and other alternative sources of financing to support mitigation and/or adaptation actions in response to climate change. |
| **Co-finance** | Defined by the Global Environment Facility (GEF as resources that are committed by the GEF agency itself or by other non-GEF sources and which are essential for meeting the GEF project objectives. |
| **Convention** | Agreement or contract between states to establish rules or regulations for a specific issue. |
| **Convention on Biological Diversity** | Known as CBD, this is the largest multilateral treaty to conserve and manage fair sharing of biological diversity. |
| **Creditor Reporting System** | Database maintained by the OECD that provides ample and detailed information related to aid. |
| **DAC** | The Development Assistance Committee is a forum within the OECD in which many of the major bilateral donors work together in support of sustainable development. |
| **Deforestation** | Reduction in tree canopy cover for the purposes of non-forest land use. |
| **Earth Summit** | United Nations Conference on Environment and Development (UNCED) held in 1992, in Rio de Janeiro, Brazil which resulted in three prominent conventions on climate change, biodiversity, and desertification. |

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| **Forest degradation** | Decrease of forest capacity/function due to human and natural factors. |
| **Global Environment Facility** | GEF is the largest multilateral institution channelling forest finance and was established in 1992 at the Rio Earth Summit. |
| **Invasive alien species** | Problems raised due to species that are introduced, accidentally or intentionally, outside their natural geographic range. |
| **International agreements on deforestation** | Agreements to protect tropical rainforests that have been made between different countries. Often these use debt-for-nature swaps whereby debt relief is offered as a mechanism to ensure conservation of the debtor country's natural forests. |
| **Land tenure security** | Recognition and protection of rights to land by others. |
| **ODA** | Official development assistance is government aid designed to promote the economic development and welfare of developing countries. |
| **Paris Agreement** | An international agreement on climate change to limit global temperature which was adopted by 196 countries in 2015. |
| **Payments for Ecosystem Services** | Payments given by the beneficiaries of environmental services to the providers of those services. |
| **Precautionary Principle** | Principle adopted in the CBD which stated the need to take measures to avoid or minimise threat if there is a threat of significant reduction or loss of biological diversity. |
| **Primary forest** | Forest that has never been logged and has developed through natural processes. |
| **REDD+** | A voluntary effort to reduce deforestation and forest degradation using policy incentives related to land-use planning and carbon markets. |
| **Secondary forest** | Forest that has been logged and has recovered naturally or artificially. |
| **Sustainable finance** | The process of taking account of environmental, social and governance considerations when making investment decisions. |
| **UNFCCC** | The United Nations Framework Convention on Climate Change is one of the Rio conventions which focus on halting the increase of the Earth's temperature by preventing anthropogenic emissions of greenhouse gases. |
| **Zero deforestation** | Commitment to keep forest uncleared or not converted to other land use. |

# 1. Introduction

## 1.1 Why global forests and biodiversity matter

**There is consensus in the scientific literature and international agreements that depletion of forests and biodiversity is a profound and existential threat to humankind, whose survival and well-being depend on them in multiple ways** (Dasgupta, 2021; UN, 2019). Biodiversity and forests are important to society's ecological, social, economic, cultural and spiritual values (Kreye et al., 2017; Gabay and Rekola, 2019). They are a source of food, materials, medicines and habitable climatic conditions, creating breathable air and fertile soil to grow food (Roe, Seddon and Elliott, 2019). A new report from the World Economic Forum (WEF) estimates that £33 trillion, or more than half of the global economy, depends directly on nature (WEF, 2020b). Although the loss of forests and biodiversity has been discussed extensively at global, national and local levels, so far there has been little progress on halting this loss (Patarkalashvili, 2019; FAO and UNEP, 2020).

**The rate of deforestation has been extremely high over the last two decades** (WRI, undated; IUCN, 2017; FAO, 2020c; Weisse and Goldman, 2020). Forest loss is the second-largest contributor to climate change after the combustion of fossil fuels (Patarkalashvili, 2019). As forests serve as global carbon stocks, their depletion causes an increase of carbon in the atmosphere, affecting the world's climatic balance (IPBES, 2019a). Large-scale forest loss can alter regional weather patterns (Nobre et al., 2016), causing flooding and drought (OECD, 2008) and affecting regional water availability and agricultural productivity (IPBES, 2019b; WEF, 2020a).

**Deforestation negatively affects access to fresh water and the ability of ecosystems to regenerate.** The consequences for livelihoods and economies are immense. Humans will face reduced access to water for agricultural, industrial and environmental purposes when forests disappear (FAO, 2020a). Pollination, which affects the regeneration of timber and other floras, will also be impeded (OECD, 2008; Gabay and Rekola, 2019). Forest loss threatens 86 million jobs (FAO, 2020b) and affects more than 2 billion people who rely on wood as fuel to meet their primary energy needs (IPBES, 2019a).

**A quarter of the world's poor and over 90% of people living in extreme poverty depend on forests for some part of their livelihoods** (OECD, 2008). Different social groups have unequal levels of access to forests and natural resources (IPBES, 2019b). As these resources become scarcer, it is the poorest who are most disadvantaged through exclusion from traditional livelihoods.

**Biodiversity and forests are synonymous and interdependent; not only are forests part of biodiversity, but healthy forests are biodiverse forests, and when forest disappears, so does its biodiversity** (Brockerhoff et al., 2017). Much of the global concern with deforestation focuses on the alarming biodiversity loss that occurs with deforestation, both in terms of the loss of the forest area itself and also in terms of the loss of the species of plants, fungi, microscopic organisms and animals that rely on the forested area (CIFOR, undated). Biodiversity loss is also caused by the overexploitation of wildlife resources and harvesting of species above allowable limits. Its loss is a problem of great significance, as it affects ecosystems' productivity and stability and the services they generate. As species interact with and depend on one another, the reduction in microbes, plants, fungi, herbivores and predators diminishes ecosystems' productivity and stability (Roe, Seddon and Elliott, 2019).

**Biodiversity loss negatively affects nature's capacity to provide products and services, including food, raw materials, medicinal, biochemical and genetic resources, fresh water and bioenergy** (Carnus et al., 2006; WWF, 2018; Himes, 2020; Mensah, Salako and Seifert, 2020; Palandrani, Battipaglia and Alberti, 2020). Biodiversity loss directly affects the 4 billion people who currently rely primarily on natural medicines for their health care and hinders the fight against cancer, as 70% of drugs used to treat it are natural or inspired by nature (IPBES, 2019b).

**Biodiversity loss has enormous biophysical impacts.** It weakens the Earth's ability to regulate climate, air quality, habitats, erosion, water quality and quantity/supply, ocean acidification, disease and pests, pollination and the dispersal of seeds and other propagules, as well as its ability to make ecosystems more resilient to extreme events and hazards (WWF, 2018; Roe, Seddon and Elliott, 2019). Biodiversity loss also affects nutrient cycling and photosynthesis, as well as the formation, protection and decontamination of soils (WWF, 2018). "There is now unequivocal evidence that biodiversity loss reduces the efficiency by which ecological communities capture

biologically essential resources, produce biomass, decompose and recycle biologically essential nutrients" (Cardinale et al., 2012, p. 60).

**With biodiversity and forests swiftly diminishing, human culture and well-being are also in danger.** Biodiversity and forests provide non-material benefits for humans such as mental and physical health and aesthetic values. About 186 million hectares of forest worldwide are used for "social services such as recreation, tourism, education, research and the conservation of cultural and spiritual sites" (FAO, 2020a). Forests are especially crucial to local and indigenous communities and poor rural populations in developing countries, whose livelihoods, employment, income and food security are highly dependent on forest resources and species (Balmford et al., 2008; OECD, 2008; IPBES, 2019b; Roe, Seddon and Elliott, 2019, FAO, 2020a).

**Forests and biodiversity also have an intrinsic value.** As argued by conservationists and some philosophers for the last two decades (see Piccolo, 2017), forests, biodiversity and nature as a whole have intrinsic value, sustaining systems of life (IPBES, 2019b). This means that nature has value in its own right, independent of human uses (Rea and Munns, 2017). Under an eco-evolutionary[1] worldview, wherein all value is attributed to both human and non-human organisms, and all value occurs within the biosphere, this intrinsic value of nature is seen as primary (Piccolo, 2017). From this perspective, the increase in deforestation, habitat loss and extinction is a problem above all else because it threatens the very existence of the biosphere (Vilkka, 1997; Piccolo, 2017; see also Hickel, 2020).

## 1.2 Definitions and concepts

**How 'forest' and 'biodiversity' are defined and conceptualised has important consequences for their management.** The definitions provided by society and policymakers determine how we understand the contribution of forest and biodiversity to the global environment and human well-being. In light of their implications, definitions related to forests and biodiversity are often not merely technical but also political, with different actors defining key concepts in varied ways.

The international **Convention on Biological Diversity** defines biodiversity as:

> *"...the variability among living organisms from all sources and the ecological complexes of which they are part, including diversity within species (genetic) and between species, as well as the diversity of habitats and ecosystems (such as forests) in which they live" (UN, 1992a).*

Many scientific papers focus on measuring biodiversity as species richness. This is typified by the emphasis placed on species extinction in discussion of biodiversity loss and the biodiversity crisis, often at the expense of attention to habitat loss, and to local flora and fauna population loss and decline.

**At the international level, three definitions of forests have been adopted by the UN, the Convention on Biological Diversity (CBD) and the Food and Agriculture Organization (FAO)** (UNFCCC, 2001; CBD Secretariat, 2006; FAO, 2020a). All three refer to a minimum area of land with a minimum percentage of tree canopy cover. According to the United Nations Framework Convention on Climate Change (UNFCCC), the total area must be at least 0.05-1.0 hectares with 10-30% canopy cover. However, some scientific studies conclude that this proportion of cover is too low and call for new, more appropriate definitions (Sasaki and Putz, 2009; Putz and Redford, 2010). The CBD and FAO stipulate a minimum area of 0.5 hectares with more than 10% of canopy cover. The CBD's definition only refers to natural forests, while the UNFCCC and FAO also include forest plantations. The CBD distinguishes between primary forests (forests that have never been logged and have developed under natural processes) and secondary forests (forests that have been logged and recovered naturally or artificially), and defines deforestation as "the conversion of forest to another land use or the long-term reduction of the tree

[1] Eco-evolutionary dynamics refers to the reciprocal interactions between ecological and evolutionary processes, and the recognition that ecological and evolutionary timescales can be so similar that evolutionary change might be rapid enough to influence ecological dynamics (Brunner et al., 2019). Under an eco-evolutionary worldview, nature is accorded intrinsic, relational and instrumental values that are attributed to both humans and non-humans, as well as eco-evolutionary processes.

canopy cover below the minimum 10 percent threshold" (CBD, 2006). Using the FAO definition of forests, the global area of natural forests in 2020 was estimated to be 4.06 billion hectares (FAO and UNEP, 2020).

**The effect on biodiversity of including plantations in the definition of forest is controversial.** Nonetheless, there is increasing evidence that mixed-species forests can provide multiple ecosystem services at a higher level than monoculture plantations (Schnabel et al., 2019). "When net deforestation declines in the tropics, attention will be drawn to the composition and structure of the retained, restored, invaded, and created forests. At that point, the seemingly inexorable trends toward increased intensities of exploitation and management will be recognised as having taken their tolls of biodiversity and other forest values" (Putz and Romero, 2014, p. 254).The multiple definitions of forest are, according to the CBD (2006), a reflection of the diversity of forests and forest ecosystems around the world and the diversity of human approaches to forests.

**Forests are important sources of biodiversity and also play a critical role in mitigating the effects of climate change.** Tropical forests, in particular, are highly biodiverse and the large number of different species present are able to perform a wide range of ecological functions such as preserving and regenerating soil, fixing nitrogen and carbon, recycling nutrients, controlling floods, mitigating droughts, filtering pollutants, assimilating waste, pollinating crops, operating the hydrological cycle and maintaining the gaseous composition of the atmosphere. Tropical forests contain an estimated 50% of the Earth's species and some 40% of the terrestrial pool of carbon in just over 10% of the Earth's terrestrial vegetation cover (Dasgupta, 2021).

## 1.3 Methods and data sources

**This literature review provides background information for the Independent Commission for Aid Impact (ICAI) review on the use of UK International Climate Finance to halt deforestation and prevent irreversible biodiversity loss.** The review is based on a set of research questions provided by ICAI (see **Table 1** below).

It explores the nature, extent, rate, drivers and consequences for deforestation and biodiversity loss, to inform judgments on the relevance of UK interventions. It describes the international agreements, institutional architecture and funding mechanisms designed to tackle deforestation and biodiversity loss, to inform ICAI's review of the UK's efforts to mobilise public and private finance in support of solutions. It explores evidence from the literature of what kinds of intervention have proved effective in halting deforestation and preventing irreversible biodiversity loss. This includes consideration of their impact on communities living in and near forests, including indigenous groups, and their role in crafting sustainable solutions. Finally, it explores the different challenges around measuring results from interventions designed to protect forests and biodiversity. The review is organised into eight thematic chapters, as follows.

Table 1: Chapter themes and research questions

| Chapter | Theme | Guiding questions |
|---|---|---|
| Chapter 1 | Background and rationale | • What are the environmental, social and economic consequences of failing to address deforestation and biodiversity loss?<br>• What are the common concepts and agreed meanings relating to biodiversity loss, deforestation and forest degradation? |
| Chapter 2 | Past and future trends | • What is the past evidence in both quantitative and qualitative terms on the nature, extent and scale of deforestation and species loss?<br>• What are future scenarios and projections showing for trends in deforestation and biodiversity loss? |
| Chapter 3 | Drivers of issues | • What are the main drivers of deforestation and species loss? |
| Chapter 4 | International and regional processes | • What are the international agreements, standards and processes for protecting forests and biodiversity? |

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| | | • What commitments has the UK signed up to? |
| Chapter 5 | International finance | • What are the key funding channels and multilateral actors for tackling deforestation and biodiversity loss?<br>• What share of international climate finance is going towards these issues?<br>• What are the barriers or explanations for any underinvestment?<br>• What has been the record on mobilising private investment into these areas, and what are the most promising strategies for doing so? |
| Chapter 6 | Effectiveness of the efforts and their approaches | • How effective have international efforts on halting deforestation and preventing irreversible biodiversity loss been to date?<br>• What are identified as the most promising intervention types across the different challenges?<br>• What approaches to citizen engagement have worked well?<br>• What has been shown not to work?<br>• How strong is the evidence base, and what are the main evidence gaps? |
| Chapter 7 | The impacts of interventions | • What is the impact of (i) deforestation and loss of biodiversity and (ii) efforts to protect forests and biodiversity on communities living in and near forests, in particular forest-dependent people and marginalised groups such as indigenous people?<br>• How are their livelihoods, communities, security and health affected?<br>• What has been the international experience of working with affected communities to develop alternative livelihoods and local governance arrangements? |
| Chapter 8 | Challenges in measuring results | • What are the challenges involved in measuring the results of interventions to protect forests and biodiversity? |

The literature review looks in particular at the three countries that are case studies for the ICAI review – Colombia, Ghana and Indonesia. These three countries were selected by ICAI because they contain a concentration of UK-funded programmes on preventing deforestation and biodiversity loss and represent the diversity of the portfolio under review. Further information about the review methodology, including the sampling criteria used to select our case study countries, can be found in our approach paper (ICAI, 2020). The literature review also draws on literature from other countries, as appropriate. The literature reviewed here comprises contemporary policy research, programme and project documents, and secondary datasets from multiple resources. The documents included in this literature review have been selected for to their relevance to the research questions and the credibility of their authors and sources. Where similar sources exist, we have prioritised more recent literature with the most up-to-date evidence. The data span is from 2010 to the time of writing. The currency conversion rates used in this literature review are those of 1 January 2020.

# 2. The global state of deforestation and biodiversity loss

**The world's pristine forests and biodiversity are diminishing at an alarming rate.** The latest report from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), which the World Economic Forum (2020) considers the most comprehensive global report to date, states that human activities have already severely altered 75% of the Earth's land (WEF, 2020a): land degradation has reduced productivity in 23% of the global terrestrial area and £177 billion to £435 billion of annual global crop output is at risk from pollinator loss (IPBES, 2019a). The majority of ecosystem services are also in decline, including those that regulate

and maintain our life support systems. Many of these ecosystem services and the ecosystems that provide them are irreplaceable. Critical ecosystems like the Amazon, which has already lost 20% of its original extent, are reaching tipping points. In the case of the Amazon, there is a risk it will shift from rainforests into savannah. Changes in land and sea use, over-harvesting, climate change, invasive alien species, and pollution of air, water and the soils, are significant drivers of biodiversity loss (Dasgupta, 2021).

**A lot of global data and reports signal a devastating rate of deforestation and biodiversity loss.** FAO's latest report on forests shows that global forest decreased by about 178 million hectares (from 32.5% to 30.8% of total land area) between 1990 and 2020, out of a total area of 4.06 billion hectares (FAO, 2020a, 2020b). The International Union for Conservation of Nature (IUCN) reaches a similar conclusion, reporting that over half of the world's tropical forests have been destroyed since the 1960s (IUCN, 2017). The World Resources Institute (WRI, undated) reports that primary forest loss in 2019 rose by 2.8% compared to 2018 (Weisse and Goldman, 2020). Across much of the highly biodiverse tropics, 32 million hectares of primary or recovering forest were lost between 2010 and 2015 (IPBES, 2019a).

Table 2: Global annual forest area net change, by decade, 1990-2020

| Year | Net change (million hectares per year) |
|---|---|
| 1990 - 2000 | -7.8 |
| 2000 - 2010 | -5.2 |
| 2010 - 2020 | -4.7 |

Source: FAO (2020a)

**Africa and South America occupy first and second place respectively in terms of forest loss in 2019, and although rates of South American forest loss have been decreasing, net forest loss in Africa has been steadily increasing over the last three decades.** The annual average net change in forest area (that is, forest loss) in 1990-2000, 2000-2010 and 2010-2020 was -3.3, -3.4 and -3.9 million hectares in Africa and -5.1, -5.2 and -2.6 million hectares in South America respectively (FAO, 2020a, 2020b). Africa has experienced an increase not only in deforestation but also in its average annual rate of net forest loss. This rate change has been most pronounced in Eastern and Southern Africa, where annual average net change in forest area was -1.3 million hectares in 1990-2000 and -1.91 million hectares in 2010-2020 – almost half the change for the continent as a whole (FAO, 2020a).

**At the country level, Brazil, Bolivia and Congo saw the highest losses in 2019** (Weisse and Goldman, 2020). The Amazon, the majority of which is in Brazil, has lost 17% of its area in the past 50 years. Overall, 32% of the world's forest area has been destroyed (WEF, 2020a). Data from WRI (2020) on forest loss in Colombia, Ghana and Indonesia shows that all three countries have experienced continuing forest loss in the last five years, especially Colombia, as Colombia's 2016 peace agreement changed occupation patterns in the Colombian Amazon (Gobierno de Colombia, 2019).

**The rate of net deforestation has decreased since 1990 but remains at high levels, and scientific studies reveal worrying future scenarios.** The rate of net deforestation fell from 7.84 million hectares in 1990-2000 to 5.17 million hectares in 2000-2010 and 4.74 million hectares in 2010-2020. Some of this decrease can be related to reduced deforestation in some countries and forest gains through afforestation and the natural expansion of forests in others. The Amazon region is near a tipping point, with large ecosystems at risk of becoming permanently non-forest areas (Lovejoy and Nobre, 2019). Models cited by the WEF (2020a) suggest that this would lead to the increased duration of droughts in the region and annual agricultural production losses of £318 million in Brazil alone. For the past five years the WEF's annual Global Risks Report has identified biodiversity loss and ecosystem collapse as mid- to high-level global risks in terms of both impact and likelihood.

**The future scenarios of biodiversity also raise a concern.** Ecosystems globally have declined by 47% in size and condition compared to estimated baselines, 41% of known insect species have declined in the past decades and

there has been a 60% population decline across vertebrate species since 1970 (WEF, 2020a). "An average of 25% of species in assessed animal and plant groups are threatened, suggesting that around one million species already face extinction, many within decades, unless action is taken to reduce the intensity of drivers of biodiversity loss" (IPBES, 2019b, pp. 11-12).

**Currently the highest rates of biodiversity loss are in the tropics, affecting the livelihoods of indigenous peoples and local communities** (IPBES, 2019b; Roe, Seddon and Elliott, 2019). Biodiversity decline between 1970 and 2014 was highest in Latin America and the Caribbean (89%), followed by the Indo-Pacific region (64%) and sub-Saharan Africa (56%) (WWF, 2018), regions that coincide substantially with areas of high poverty and are likely to be hardest hit by climate change (Roe, Seddon and Elliott, 2019). Patarkalashvili (2019) reports that roughly 390,900 plant species are known to science, of which about 369,400 are flowering and medicinal plants used by indigenous peoples and local communities. Over 96,000 species have been assessed for their conservation status for the latest update of the IUCN Red List, which finds that 27,514 plant species (around 26%) are threatened with extinction. Scientists believe that some of the main threats are climate change, habitat loss, disease and invasive species (IPBES, 2019a).

# 3. The main drivers of deforestation and biodiversity loss

**Deforestation and biodiversity loss are closely interlinked.** A wide diversity of habitats and species are found in the forests that cover just over 30% of the world, providing habitats for the vast majority of the terrestrial plant and animal species known to science (Roe, Seddon and Elliott, 2019; FAO & UNEP, 2020). Over 80% of the world's terrestrial biodiversity can be found in forests (IUCN, 2017). Tropical forests in particular are one of the most diverse types of ecosystem on the planet: covering just 7% of the globe, they support over half of all terrestrial plant and animal species (Patarkalashvili, 2019).

**Deforestation therefore directly drives biodiversity loss. In general, given the complexity of ecosystems, all drivers of change in nature are interconnected in some way.** Both deforestation and biodiversity loss are the result of imbalances in the local, national and global ecological equilibrium caused by a combination of social, economic, political and other factors. Forests and biodiversity "continue to be under threat from actions to convert the land to agriculture or unsustainable levels of exploitation, much of it illegal" (FAO and UNEP, 2020, p. 189).

**Forests and biodiversity have historically been affected by natural disasters such as fires, hurricanes, droughts, ice storms and insect pest and disease outbreaks, but the current drivers are anthropogenic.** These drivers started with the industrial revolution in the 1800s, but also include commercial agriculture and rapid population expansion in the tropics in the last decades, which, taken together, mean human activity has driven global climate change and made forest ecosystems more vulnerable to damage (FAO and UNEP, 2020, p. 189). As the WEF (2020a, p. 9) points out, "The human population has doubled, the global economy has expanded four-fold and more than 1 billion people have been lifted out of extreme poverty. Globally, we produce more food, energy and materials than ever before." In the 5th Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) concluded that there is more than a 95% probability that human activities over the last 50 years have warmed our planet (Patarkalashvili, 2019).

## 3.1 Direct drivers

**The majority of direct drivers of deforestation and biodiversity loss are caused by human intervention. These** include overexploitation, human-induced fires, invasive plant species, excessive logging, non-sustainable forest management, agricultural expansion, infrastructure development and urban development (Patarkalashvili, 2019; FAO, 2020a). IPBES (2019b) identifies five of these drivers as accounting for more than 90% of nature loss in the past 50 years:

i) land use and land-use change (such as deforestation)
ii) climate change
iii) natural resource use and exploitation

iv) pollution
v) invasive alien species.

**Forest dependency is closely linked with poverty. Millions of poor people depend on forests for subsistence as well as income needs.** According to the World Bank, 736 million people lived below the international poverty line of $1.90 a day in 2015. Around 75% of the poor inhabit rural areas, in many cases regions of high forest cover. A number of studies conclude that poor and vulnerable populations tend to concentrate in environmentally fragile areas and rely disproportionately on natural resources and ecosystem services. At the same time, scientific evidence shows that forests can support rural livelihoods, have a buffer function in maintaining livelihoods and represent a form of natural insurance (Miller et al., 2020, Wunder et al., 2014).

**Land use and land-use change constitute one of the most critical drivers of deforestation and biodiversity loss** (Maxwell et al., 2016; FAO and UNEP, 2020). Forests are cleared for agriculture, access to extractive resources, urbanisation and other reasons (UN, 2019). Half of all habitable land is now used for agriculture and livestock (Ritchie and Roser, 2013). Between 2002 and 2013, loss of humid tropical primary forest, one of the most biodiverse ecosystems in the world, increased from 3 million hectares to 4.3 million hectares per year (NYDF Assessment Partners, 2019). Land use and land-use change constitute the second main driver of climate change after fossil fuel energy consumption, accounting for about 20% of global emissions (Patarkalashvili, 2019). Climate models predict a significant increase in conditions that lead to more frequent and more severe fires (De Groot, Flannigan and Cantin, 2013).

**Deforestation and climate change drive biodiversity loss.** Deforestation damages habitat area, with serious impacts on flora and fauna (Bhuiyan et al., 2018). A study found that deforestation substantially increased the risk of extinction of more than 19,000 species of birds, amphibians and mammals that are listed on the IUCN Red List as threatened and exhibiting declining populations (Betts et al., 2017). Another study found that "land-use change is one of the greatest threats to biodiversity, especially in the tropics where secondary and plantation forests are expanding while primary forest is declining" (Phillips, Newbold and Purvis, 2017, p. 2251). A major cause is logging that exceeds sustainable limits, affects protected species and/or is done in ecologically sensitive areas (Noguerón et al., 2018). "Legality is not synonymous with sustainability: what is sustainable may not always be legal, and what is legal may not always be sustainable" (Noguerón et al., 2018). For instance, indigenous communities may sustainably extract logs for subsistence needs from a statutorily protected area as they have done for hundreds of years without harm to the forest. This would be illegal but sustainable. Legal logging is also a problem, as "in many instances there is no clear-cut boundary between impacts associated with legal versus illegal activities since both may lead to similar impacts" (EIA, 2012; Pacheco et al., 2016). Climate change is already contributing to rapid, broad-scale ecosystem changes, with significant consequences for biodiversity (Dasgupta, 2021; Bhuiyan et al., 2018; Nunez et al., 2019). According to the World Wildlife Fund (WWF, 2018), climatic variability alters the reproduction, migration and distribution of species globally. Coral reefs, for instance, are projected to decline by a further 70% to 90% at 1.5°C of warming, with larger losses of over 99% at 2°C of warming (IPCC, 2018).

**Natural resource use and exploitation, pollution, and invasive alien species, the other three main drivers of environmental change, are important causes of habitat and ecosystem alteration and biodiversity loss.** As part of human natural resource use and exploitation, the annual extraction of natural resources including fossil fuels and biomass has increased 3.4-fold since 1970 (IRP, 2019). Around 115 million tonnes of mineral nitrogen fertilisers are applied to croplands each year globally. A fifth of this accumulates in soils and biomass, while 35% enters the oceans (Mateo-Sagasta, Zadeh and Turral, 2018), putting the terrestrial and water ecosystems, biodiversity and human health at risk (Khan et al., 2018). Across a set of 21 countries with detailed records there has been a 70% increase in the number of non-native species by country since 1970, with adverse impacts on local ecosystems and biodiversity (IPBES, 2019a).

## 3.2 Indirect drivers

**Indirect drivers of deforestation and biodiversity loss are complex and linked to economic development** (OECD, 2019). Indirect drivers include markets and global supply chains, land use and land occupation patterns, population growth and consumption patterns. Rapid population growth often implies the expansion of human centres and activities into wildlife habitat areas, increased air pollution and higher demand for economic and environmental resources (Bhuiyan et al., 2018). These deforestation pressures associated with rapid population growth are particularly pronounced in areas of low existing levels of human development (low Human Development Index, which measures income, health and education). Jha and Bawa (2006, cited in Bhuiyan et al., 2018) found that low human development leads to increased deforestation under the pressure of high population growth, while high human development leads to reduced deforestation despite high population growth. Natural forests are converted into profitable plantations, with soy and oil palm two of several important commodities linked to deforestation (WWF, 2018). Large-scale biofuel development raises concerns about rising food prices, deforestation and competition for land (OECD, 2008). Additionally, infrastructure development, including roads, cities, hydroelectric dams and oil and gas pipelines, results in deforestation, habitat fragmentation and biodiversity loss (IPBES, 2019b).

**Unlimited economic growth is another important factor in the destruction of the environment in general and of forests and biodiversity.** IPCC reports set out climate change scenarios based on prevailing economic growth patterns, suggesting that an energy-intensive economic growth path leads to high greenhouse emissions and thus exacerbates climate change and environmental damage (IPCC, 2000, 2018). Some scholars argue that economic growth is inherently damaging to the environment and call for a 'degrowth' approach. For example, Weiss and Cattaneo (2017, p. 220) write: "economic growth cannot be sustained ad infinitum on a resource constrained planet and that degrowth requires far reaching societal change". Hickel (2020) goes further, arguing that a global economic system that demands continued growth is the primary driver of deforestation and biodiversity loss. Others argue that it is possible to 'decouple' economic growth from unsustainable consumption of national natural resource (UNEP, 2014) through a 'green growth' approach (OECD, 2011). Green growth strategies may include a role for the private sector, through either corporate social responsibility projects and/or market-based strategies that raise the cost of unsustainable resource use.

# 4. International responses to deforestation and biodiversity loss and its challenges

International negotiations on deforestation and biodiversity loss have resulted in a range of agreements, standards, processes, policies and practices for the protection of forests and biodiversity. This chapter discusses the available responses to the interconnected issues of deforestation and biodiversity loss.

## 4.1 International agreements

**International agreements on halting deforestation and preventing irreversible biodiversity loss have proliferated in the past three decades.** The agreements have mainly been developed since the United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit, held in Rio de Janeiro in 1992. The summit resulted in three main conventions: the United Nations Framework Convention on Climate Change (UNFCCC) (https://unfccc.int/), the Convention on Biological Diversity (CBD) (https://www.cbd.int/), and the United Nations Convention to Combat Desertification (UNCCD). The UNFCCC and the CBD provide an umbrella framework for international agreements, standards and processes regarding halting deforestation or preventing irreversible biodiversity loss. The United Nations Forum on Forests (UNFF) is an intergovernmental policy forum, established in 2000, which promotes "management, conservation and sustainable development of all types of forests and to strengthen long-term political commitment to this end". While this is a UN body specifically discussing the issue of forests, other UN initiatives, such as UNFCCC and CBD, have gained relatively more attention, since they have both developed high-profile international agreements and conventions.

### 4.1.1 International agreements on halting deforestation

**The Bali ministerial declaration in September 2001 galvanised political action around illegal logging, which at the time was seen as a major driver of deforestation.** The meeting was organised under the World Bank's East Asia Forest Law Enforcement and Governance (FLEG) programme. The World Bank convened a series of regional dialogues bringing together governments, businesses and non-governmental organisations (NGOs) to discuss action aimed at tackling illegal logging and related trade. The Bali meeting included ministers from all countries in the region except Malaysia. The declaration changed the political dynamics around illegal logging, recognising that exporting and importing countries had joint responsibility and needed to take joint action. The Bali declaration directly stimulated further action by the UK government and the EU. The proposal for an EU Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan was endorsed by the EU Council of Ministers in October 2003 and sets out measures designed to prevent the importation of illegal timber into the EU, improve the supply of legal timber and increase demand for timber from responsibly managed forests (European Commission, 2003). Voluntary Partnership Agreements (VPAs), designed to regulate the trade in legal timber from producer countries in return for assured access to European timber markets, are being negotiated or implemented in a number of countries across Asia, Africa and Latin America.

**The UNFCCC is the largest of the three Rio conventions outlined above.** It has 197 signatories and aims to "prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors" (UN, 1992b art. 4c). The Convention also indirectly promotes the protection of biodiversity through sustainable management of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests, oceans and other terrestrial, coastal and marine ecosystems (UN, 1992b art. 4d).

**Under the UNFCCC there are two main international agreements:** the Kyoto Protocol (UN, 1998) and more recently the Paris Agreement (UN, 2015). These two agreements include national self-declared targets for greenhouse gas (GHG) emission reduction, known as nationally determined contributions (NDCs). In some cases the parties specify the extent to which their forestry sector is expected to contribute to their GHG emission reduction target by 2030. The UK ratified the Kyoto Protocol on 31 May 2002, and it came into force on 3 February 2006 (Defra, 2006), and the Paris Agreement in 2016 (FCO, 2016).

**While the earlier 1997 Kyoto Protocol had set a solid basis for the Clean Development Mechanism (CDM), it had not fully addressed biodiversity and deforestation.** The methodological difficulty of accurately counting GHG emissions from land use, land-use change and forestry (LULUCF) had constrained progress in the forestry sector. The 2005 Conference of the Parties (COP) meeting in Montreal drafted conclusions about starting a process to address reducing emissions from deforestation (RED). Later a second D, standing for forest degradation, was added with the development of Reducing Emissions from Deforestation and Forest Degradation (REDD+). The plus element signifies the importance of the roles of conservation, sustainable forest management, enhancement of forest carbon stocks, and taking into account the needs of local and indigenous communities when action is taken to reduce emissions from deforestation and forest degradation in developing countries (FCCC/CP/2007/6/Add.1).

**While a framework of agreements to prevent deforestation is in place, the progress of policymaking at international level is slower than expected.** The 2006 Intergovernmental Panel on Climate Change (IPCC) guidance and the Stern Review indicated that reducing emissions from deforestation and land-use activity has the second-greatest potential for reducing GHG emissions, after improving energy efficiency (IGES, 2006; Stern et al., 2006). REDD+ came into existence a year later at the 2007 COP meeting in Bali. This responded to a campaign by civil society in the global South, including indigenous peoples' groups, that the forestry sector be placed high on the UNFCCC's agenda. The conference resulted in the Bali Action Plan, which dedicated a few paragraphs to REDD+ as a voluntary programme providing policy incentives to reduce deforestation and forest degradation. REDD+ raised the expectation that the world would take rapid action to protect forests. However, policy development did not follow as quickly as expected.

**Due to the slow development of REDD+, there are now several parallel international collaborations and initiatives aiming to halt deforestation.** One of the largest leader coalitions at the subnational level is known as the Governors' Climate and Forests (GCF) Task Force, which was initiated by a group of provincial and state governors covering 38 states and provinces across the globe that manage one-third of the world's tropical forests. The task force aims to protect tropical forests, reduce emissions from deforestation and forest degradation, and promote realistic pathways to forest-maintaining rural development (GCF Task Force, undated). Some private sector initiatives such as the Consumer Goods Forum, the Tropical Forest Alliance and the International Tropical Timber Organization (ITTO) seek to halt deforestation by making specific commodities more sustainable, to reduce pressure on forests, such as oil palm that grows side-by-side with forests (TFA, 2020, ITTO, 2020; the Consumer Goods Forum, 2020).

Table 3: international agreements, conventions and accords signed by the UK on reducing deforestation

| Convention / agreement | Explanation of the convention | Year of UK ratification |
|---|---|---|
| International Tropical Timber Agreement | Provides a framework for cooperation between tropical timber producers and consumers and encourages the development of national policies aimed at sustainable utilisation and conservation of tropical forests and their genetic resources. The International Tropical Timber Organization was established under this agreement. | 1983 |
| New York Declaration on Forests | The declaration aimed to end the loss of natural forests by 2030. This was a voluntary and non-binding international declaration first endorsed at the UN climate summit in 2014. Over 200 signatories including national governments, subnational governments, multinational companies, groups representing indigenous communities, and non-governmental organisations. | 2014 |
| UNFCCC – Paris Agreement | Binding international agreement signed by 196 governments that commits to stabilising greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system". Includes agreement on REDD+. | 2015 |
| The Amsterdam Declarations Partnership | Launched in the context of the Paris Climate Agreement and signed by nine European countries (Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain and the United Kingdom) in support of the New York Declaration on Forests underlining the global importance of protecting primary forests and high conservation value areas through responsible supply chain management. | 2015 |
| Germany, Norway, UK Partnership (GNU) | The three governments entered into a joint agreement pledging $5 billion to reduce carbon emissions caused by tropical deforestation, known as REDD+ under the UNFCCC. Commitment to spend around $800 million per year starting in 2015, with finance reaching $1 billion per year by 2020. | 2015 |

Source: authors' analysis, compiled from various sources

### 4.1.2 International agreements on preventing irreversible biodiversity loss

**The Convention on Biological Diversity (CBD) is the second of the three Rio conventions.** It recognises biological diversity as including plants, animals and microorganisms and their ecosystems, and people and their need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment. The CBD

includes two supplementary agreements, the Cartagena Protocol on Biosafety (hereafter the Biosafety Protocol) and the Nagoya Protocol on Access and Benefit-sharing.

The Biosafety Protocol, agreed upon 11 years after the Rio Convention, has 103 signatories, including the UK. It provides a common and binding framework for countries to address issues of safety in biotechnology, including precautionary principles and arrangements for information sharing (CBD Secretariat, 2000). The Protocol was agreed upon after extensive negotiations on the consequences of, and safeguarding policy for, genetically modified organisms (GMOs). The disputes and disagreements about this are discussed in the next section.

**The second supplementary agreement, the Nagoya Protocol on Access and Benefit-sharing, was agreed upon in October 2010 and entered into force in 2014** (CBD Secretariat, 2011). It considers the interests of businesses in various countries to access and use genetic resources, and the rights of indigenous peoples and traditional communities to access the benefits arising from the utilisation of such resources or knowledge.

The Nagoya Protocol provides a framework for the effective implementation of one of the CBD's three objectives: the fair and equitable sharing of benefits arising out of the utilisation of genetic resources. The UK government signed the Nagoya Protocol in June 2011, thereby making a political commitment to ratify it (ICF GHK, 2012), and is currently exploring implementation options that will meet its requirements (ICF GHK, 2012). It has not yet defined how the mechanisms set out in the Protocol will function in the UK or what institutions might be involved. Since the UK exited the EU, it has had to consider its own measures to fulfil its commitments to the Nagoya Protocol (CIPA, 2020). Beyond the Nagoya Protocol, the UK has been a strong proponent of halting biodiversity loss since discussion about this began (see **Table 3**).

### Table 4: The UK's position on international agreements about preventing irreversible biodiversity loss

| Convention | Explanation of the convention | Year of UK ratification |
|---|---|---|
| International Plant Protection Convention | Protects cultivated and wild plants by preventing the introduction and spread of pests. | 1953 |
| Convention on International Trade in Endangered Species of Wild Fauna and Flora | Recognises the need for the protection of certain species of wild fauna and flora against over-exploitation through international trade. | 1976 |
| Convention on Wetlands of International Importance especially as Waterfowl Habitat | Recognises that wetlands constitute a resource of great economic, cultural, scientific and recreational value which must be conserved. | 1976 |
| World Heritage Convention | Protects the world's cultural and natural heritage. | 1984 |
| Convention on the Conservation of Migratory Species of Wild Animals | Recognises that wild animals in their innumerable forms are an irreplaceable part of the Earth's natural system that must be conserved. | 1985 |
| International Treaty on Plant Genetic Resources for Food and Agriculture | Recognises farmers' contribution to the diversity of crops and establishes a global system to provide farmers, plant breeders and scientists with access to plant genetic materials. | 2004 |

Source: CBD Secretariat (2017)

## 4.2 Regional policies and practices

**There is a wide range of approaches across Asia, Africa, Europe and Latin America regarding policy and practice to halt deforestation and prevent biodiversity loss.** Despite its rapid rate of deforestation and its biodiversity loss, Southeast Asia has been the most active subregion on this subject since the early 1990s. Between 2005 and 2010, the region lost about 1.1 million hectares of forest every year (FAO, 2020c).

### 4.2.1 Regional policies and practices for halting deforestation

**With 16% of the world's tropical forests and biodiversity, Southeast Asia, through the Association of Southeast Asian Nations (ASEAN), has developed some concrete policies and actions** (FAO, 2020a). In 2016, ASEAN published a clear and specific cooperation policy on protecting the region's forests until 2025 (ASEAN, 2016a). The policy has five main strategic action plans for enhancing: (1) sustainable forest management (SFM), (2) trade facilitation, economic integration and market access, (3) the forestry sector's resilience and role in addressing climate change, (4) institutional strengthening and human resources development and (5) ASEAN members' joint approaches to regional and international issues affecting the forestry sector. A supplementary policy is the Work Plan for Forest Law Enforcement and Governance (FLEG) (ASEAN, 2016b).

**The Latin America region, and especially the Amazon Basin, hosts 40% of the world's tropical forests and biodiversity, more than anywhere else in the world** (Watson as cited in World Bank, 2019). The region has formed a coalition known as the Amazon Cooperation Treaty Organization (ACTO), which has eight member countries: Brazil, Bolivia, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela. In 2010, these countries agreed on an extended forest-cover monitoring technology model and package, to be implemented by Brazil with international funding (ACTO, 2017). In its response to the Nagoya Protocol on benefit sharing, ACTO and the Fund for the Development of Indigenous Peoples of Latin America and the Caribbean (FILAC) recently signed a framework cooperation agreement that will benefit Amazonian indigenous peoples in member countries (ACTO, 2020).

**As the world's second-largest tropical rainforest, in 2002 the Congo Basin subregion formed a partnership known as the Congo Basin Forest Partnership (CBFP)** (CBFP, undated), which urges international cooperation on the conservation and sustainable management of Congo Basin forests, as agreed in the 1999 Yaoundé Declaration. The partnership includes ten Central African countries and almost 100 institutions concerned with Congo Basin forest ecosystems, including the Economic Community of Central African States (ECCAS), the Commission des Forêts d'Afrique Centrale (COMIFAC), financial partners, the Congo Basin's civil society organisations (CSOs), international NGOs, multilateral organisations, research and training institutions and private sector actors. In addition, there are several other ongoing initiatives led by the African Development Bank (AfDB) and some private actors and foundations such as the Southern African Development Community (SADC) Protocol on Forestry (African Development Bank Group, undated; SADC, undated).

### 4.2.2 Regional policies and practices for preventing biodiversity loss

**A number of ASEAN's initiatives are managed by the ASEAN Centre for Biodiversity (ACB).** These include the ASEAN Heritage Parks (AHP) programme, which provides capacity building and meetings for AHP managers to exchange knowledge and best practice, the ASEAN Youth Biodiversity programme, and the ASEAN Small Grant Programme (Yayasan Penabulu, 2020). ACB also provides analysis to support ASEAN member states in relevant policymaking. One of its studies is 'The Biodiversity and Ecosystem Services Assessment and Economic Analysis for Management Policy and Innovative Financing Applications (BESA++)'. Regional workshops also support ASEAN member states' policy development on payments for watershed ecosystem services, carbon financing, and optimal setting of ecosystem service fees in protected areas.

**A number of public and private actors lead policy initiatives and practices in the African region.** One of the largest public initiatives in Africa is supported by the EU through a biodiversity-focused development programme known as Biodiversity for Life (B4L) (EU, undated). Despite the large number of institutions involved in this programme, it has received criticism for the potential conflicts and contradictions within it (LaRocco, 2019). An evaluation of the EU's biodiversity strategy to 2020 has yet to report its findings, although in a recent public

consultation round it was recognised that the EU has shown leadership in supporting biodiversity initiatives through programmes such as B4L (WCS, 2021). Other initiatives are led by multilateral banks, CSOs and private companies. The AfDB has led some discussions on biodiversity protection, which have now been discontinued. Another public-private partnership involves WWF Nedbank Green Trust, a commercial bank (African Development Bank Group, undated).

**In the Latin American region, several policy initiatives and practices are managed by multiple actors.** Two of the largest of these are the Commission on Ecosystem Management (CEM), comprising 13 countries,[2] and the Partnership for the Conservation of Amazon Biodiversity (PCAB) (PCAB, undated; IUCN, 2017). The CEM has become a platform for collaboration where researchers, NGOs, governments and the private sector discuss and address specific ecosystem issues, while the PCAB focuses on biodiversity issues in the Brazilian Amazon ecosystem and improving the well-being of its forest-dependent communities. The Latin American and Caribbean Network of Environmental Funds (RedLAC), set up to advance cooperation on environmental funding in 1999, has 25 members from 17 countries across Mesoamerica, South America and the Caribbean Islands (RedLAC – Sitio oficial de RedLAC, undated).

# 5. Climate finance for halting deforestation and preventing irreversible biodiversity loss

**Halting deforestation and preventing irreversible biodiversity loss are relatively neglected areas of international climate finance.** The amount allocated to these two objectives is difficult to calculate owing to fragmented sources of information. A large share of climate finance is allocated across multiple sectors, including forestry, without the sectoral shares clearly identified. However, numerous barriers to deploying funds for tackling deforestation mean it is routinely deprioritised in favour of more straightforward investments in energy and transport.

**Climate finance data on halting deforestation is fragmented.** There is neither a globally accepted definition of climate finance nor a single platform to track it. Different sets of climate finance data define forestry finance differently, making it difficult to obtain a global view of the amount allocated to halting deforestation. Despite this technical challenge, some studies have taken stock of REDD+ finance. Norman and Nakhooda (2015) show that the aggregate pledges of public and private finance between 2006 and December 2014 are significant at more than £7.4 billion, but that the pace of new pledges slowed after 2010. The finance data presented here is sourced from multiple climate finance platforms, mainly those of international public institutions including the OECD Development Assistance Committee's (DAC) Creditor Reporting System (CRS), the Global Environment Facility (GEF) database and some secondary online sources.

**The global share of forest and biodiversity finance in total climate finance and official development assistance (ODA) is not tracked in a comprehensive manner,** although some environment and climate finance platforms provide an early insight into the proportion of climate finance allocated to these issues. In general, only a small percentage of ODA is spent on halting deforestation and preventing irreversible biodiversity loss. From 2009 to 2018, about $4.8 billion was disbursed as forest finance by official DAC donors, covering forestry and administrative management, forestry management, fuelwood and charcoal, forestry education and training, forestry research, and the forestry service.[3] This was only 0.29% of total ODA spent globally during that period. Biodiversity finance is similarly relatively low, although more than forestry finance, at $9.4 billion over the same period.[4]

GEF's data on environment finance also shows relatively little funding aimed directly at halting deforestation and preventing irreversible biodiversity loss. In GEF's finance data framework, the forestry element is neither separately tracked nor labelled as part of climate finance. The data only allows for the identification of finance

[2] The members of the CEM are Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, France - French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela.
[3] Forestry finance is classified by the OECD DAC CRS under category number 312.III.1b.
[4] Biodiversity finance is classified by the OECD DAC CRS under multisector number 41030.

allocated to restoring degraded land, which is associated with forestry. **Table 5** shows that the total allocation of finance to enhancing biodiversity and reducing land degradation is about 30% of all GEF's spend in its lifetime. With this limitation, the amount of forest finance stated in this literature review may be underestimated, as GEF has no specific forest finance category, and some relevant forestry projects are categorised as climate change and/or included in other climate change sectors such as energy, agriculture, waste and health. Biodiversity finance may also be underestimated here, as in some cases biodiversity is treated as a co-benefit of forestry finance.

### Table 5: GEF's biodiversity and land use focal areas

| Category | Proportion of GEF funds |
|---|---|
| Biodiversity | 12.2% |
| Biodiversity and others | 9.4% |
| Land degradation | 3.1% |
| Land degradation and others | 5.1% |
| Others | 70.3% |

Source: authors' analysis based on data taken from GEF project website, link.

## 5.1 Funding channels for halting deforestation

**From 2009 to 2018, funding for halting deforestation was dominated by bilateral channels.** OECD DAC countries together provided £3.6 billion in bilateral forest finance. OECD DAC data for this period shows the UK in third place, providing 12.2% of total forest finance together with other major actors: the EU as an institution (18.7%) and several other DAC countries, namely Japan (20.2%), Germany (11.3%), Finland (5%) and France (4.2%) (OECD, undated b). With the establishment of ICF and recent increase in ICF commitments, the £1.8 billion in bilateral forest finance pledged by the UK is equal to half the amount provided by all the other DAC countries combined.

### Table 6: The forest finance landscape

| Forest finance | Total amount | Period | Status | Multilateral / Bilateral | Financial instrument |
|---|---|---|---|---|---|
| **Governmental mechanism** | | | | | |
| Global Environment Facility (GEF) | $11.9 billion (£9.0 billion) | 2009–2018 | Disbursed | Multilateral | 12% grant, 88% co-financing |
| All DAC countries | $4.8 billion (£3.6 billion) | 2009–2018 | Disbursed | Mixed | Mixed grants and loans |
| EU | $1.3 billion (£1.0 billion) | 2009–2018 | Disbursed | Mixed | Mostly grant |
| Multilateral development banks including regional development banks and UN | $0.4 billion (£0.3 billion) | 2009–2018 | Disbursed | Multilateral | Mixed grants and loans |
| Other multilaterals | $0.5 billion (£0.4 billion) | 2009–2018 | Disbursed | Mixed | Mostly grant |

| | | | | | |
|---|---|---|---|---|---|
| Forest Carbon Partnership Facility (FCPF) | $1.3 billion (£1.0 billion) | 2008–2025 | Partially disbursed | Multilateral | Results-based financing |
| Forest Carbon Partnership Facility (FCPF) | $1.3 billion (£1.0 billion) | 2008–2025 | Partially disbursed | Multilateral | Results-based financing |
| Forest Investment Program (FIP) | $0.5 billion (£0.4 billion) | 2008–2023 | Partially disbursed | Multilateral | 24% loan, 75% grant, 1% equity |
| Biocarbon Fund | £0.065 billion | 2013–2020 | Disbursed | Multilateral | Results-based financing |
| Congo Basin Forest Fund (CBFF) | £0.013 billion | 2009–2014 | Disbursed | Multilateral | 100% grant |
| GCF Arbaro Fund | $0.2 billion (£0.15 billion) | 2020–2032 | Committed | Multilateral + equity | 12.5% grant, 87.5% equity |
| UK ICF (forestry) | £525 million in current bilateral aid, an additional £1.3 billion programming (part of £4.4 billion climate finance). ICF also funds UK support for multilateral funds such as GEF and FCPF. | 2016–2021 | Disbursed<br><br>Committed | Mixed | Grant, loan and guarantee |
| **Non-government mechanism** | | | | | |
| Global Forest Fund | €80,000 (£67,672) | 2008–2019 | Disbursed | Private | 100% grant |
| Climate and Land Use Alliance | $0.6 billion (£0.5 billion) | 2010–2019 | Disbursed | Private | 100% grant |
| AGRI-3 | $1 billion (£0.8 billion) | N/A | Committed | Private | 5% grant, 25% soft loan, 70% commercial loan |

*Conversion rate on 1 January 2020
Source: (ICF, undated; Forest Carbon Partnership Facility, undated; Initiative for sustainable forest landscape, undated; CBFF, undated; Climate and Land Use Alliance, undated; Global Forest Fund, undated; IDH, undated; OECD, undated a; SADC, undated; Climate Investment Funds, 2017)

**To date the Global Environment Facility (GEF) is the largest multilateral institution channelling forest finance, among other multilateral funds and multilateral development banks (MDBs).** From 2009 to 2018, GEF provided £9.0 billion, of which 12% was in the form of grants and the rest was co-financed by other donors in the forms of grants, loans and investments by private companies, CSOs and multilateral agencies. Other multilateral agencies have channelled smaller amounts of forest finance. As a newly established institution, the Green Climate Fund has just started to provide financing to halt deforestation. Its Arbaro Fund focuses on sustainable forestry and zero-deforestation cocoa production to reduce emissions in Côte d'Ivoire (African Development Bank Group, undated; GCF, undated).

**Although the amount of forest finance provided by multilateral organisations is small, they use a wide range of financial instruments, including results-based payments, equity and dedicated grant mechanisms.** For example, the Forest Carbon Partnership Facility (FCPF) Carbon Fund pilots results-based payments to 23 countries that have advanced through REDD+ readiness and implementation and achieved verifiable emission reductions in their forest and broader land-use sectors. Forest Investment Program (FIP) Climate Investment Funds are piloting

Private Sector Set Asides (PSSAs) which allocate concessional financing on a competitive basis to projects that engage the private sector in sustainable forestry, and have a £60 million Dedicated Grant Mechanism for Indigenous Peoples and Local Communities (DGM) (CIF, 2016).

**Some regional multilateral agencies only provide short-term grants, which raises questions as to the sustainability of their results.** Innovative financing instruments, designed to mobilise other financial flows, are thought to be more sustainable. Public-private initiatives have emerged offering a blend of grants, concessional loans and commercial loans. Recently, public-private mechanisms have begun to offer a mixture of financing instruments. In 2019, the Dutch government and Rabobank pledged £0.8 billion to be spent on a sustainable agriculture and forestry initiative known as AGRI3.

## 5.2 Funding channels for preventing biodiversity loss

**Table 7 shows that, from 2009 to 2018, finance allocated to preventing biodiversity loss was dominated by multilateral channels, with GEF the key institution.** From 2009 to 2018, GEF channelled £23.7 billion, 17% as grants and the rest as co-finance. This is four times the amount of biodiversity finance provided by all DAC countries in the same period. With increasing pressure on and global threats to biodiversity, the UK recently launched the UK Biodiverse Landscapes Fund, to which it allocated £100 million for 2021 to 2026, although the fund is not yet operational. This was in addition to support provided through the Darwin Initiative, which has been providing small grants to biodiversity projects in 159 countries since 1992 (UK Aid, 2020).

### Table 7: Biodiversity finance landscape

| Biodiversity finance | Total amount | Period | Status | Financial instrument |
|---|---|---|---|---|
| **Government mechanism** | | | | |
| GEF | $31.4 billion (£23.7 billion) | 2009–2018 | Disbursed | 17% grant, 83% co-financing |
| All DAC countries | $7.1 billion (£5.4 billion) | 2009–2018 | Disbursed | |
| EU | $0.4 billion (£0.3 billion) | 2009–2018 | Disbursed | |
| MDBs | $0.3 billion (£0.2 billion) | 2009–2018 | Disbursed | |
| Other multilateral institutions | $1.2 billion (£0.9 billion) | 2009–2018 | Disbursed | |
| World Bank | $6.4 billion (£4.8 billion) | 1988–2009 | Disbursed | 31% loan, 22% GEF, 45% co-financing, 2% trust fund |
| Germany's International Climate Initiative (IKI) | €0.5 billion (£0.4 billion) | 2011–2024 | Partially disbursed | 100% grant |
| UK Darwin Initiative | £230 million | 1992–2020 | Disbursed | 100% grant |
| UK Biodiverse Landscapes Fund | £100 million | 2021–2026 | Committed | 100% grant |
| **Non-government mechanism** | | | | |
| Critical Ecosystem Partnership Fund | $0.2 billion (£0.15 billion) | 2001–2019 | Disbursed | 100% grant |
| Arcus Foundation | $0.1 billion (£0.08 billion) | 2007–2019 | Disbursed | 100% grant |
| Brazilian Biodiversity Fund (FUNBIO) | $0.6 billion (£0.45 billion) | 1996–2020 | Disbursed | 100% grant |

*Conversion rate on 1 January 2020
Source: (Projects, undated; FUNBIO, undated; Arcus Foundation, undated; CEPF, undated; World Bank, 2009; Government of Germany, 2018; European Commission, 2019; UK Aid, 2020)

**The total amount of biodiversity financing channelled through multilateral agencies other than GEF is relatively low.** While the World Bank provided as much as £4.8 billion in biodiversity financing between 1988 and 2009 (World Bank, 2009), according to the CBD the World Bank contribution has been declining in the past decade, to £0.2 billion per annum. The EU's contribution to biodiversity finance is much smaller than its contribution to halting deforestation. In the period from 2009 to 2018, it allocated £0.4 billion to the former and £1 billion to the latter. Within the EU, the German government has allocated a substantial amount of biodiversity finance through the International Climate Initiative (IKI) since 2011, and aims to provide £0.4 billion by 2024 (Government of Germany, 2018).

**Some non-governmental organisations have provided biodiversity finance, mostly in the form of grants.** These include international and national funds such as the Critical Ecosystem Partnership Fund, the Arcus Foundation and the Brazilian Biodiversity Fund (FUNBIO). FUNBIO was created by a multidisciplinary group of representatives of the Federal Government of Brazil, academia, civil society and the business world on the strength of a £15 million donation from GEF and has been active since 1996. For the last 24 years, it has been a strategic partner to these sectors and has disbursed £0.45 billion to 306 projects across all of Brazil's biomes.

## 5.3 Barriers to forestry and biodiversity finance

**The limited finance available for forestry and biodiversity is linked to a series of challenges in the forest sector that hamper effective utilisation of funds.** A substantial share of the allocated funding uses results-based finance: that is, funds are disbursed to recipients following demonstrated achievement in reducing deforestation. Slow progress on implementing forestry and biodiversity initiatives therefore leads to slow disbursal of funds. This is linked to weak governance in the two sectors, including unclear rules on land use and uncertain land tenure status, leading to frequent land conflicts. There are challenges around limited project scalability and replicability and a lack of established frameworks for monitoring conservation impacts (Huwyler, Kappeli and Tobin, 2016; Yang and Harrison, 2019). For financing mechanisms that seek to mobilise private finance, it is difficult to generate returns halting deforestation or preventing irreversible biodiversity loss. Moreover, the OECD (OECD, 2019) states that finance related to biodiversity is reported differently across countries, risking double counting and undercounting and thus undermining the reliability of any resulting estimates. All of these factors discourage engagement and investment in sustainable forestry and biodiversity. As a result of such factors, Norway's commitment of $1 billion (£0.8 billion) in REDD+ finance to Indonesia in 2010 only realised its first results-based payment in 2016-17 (Fay and Denduangrudee, 2018; Seymour, 2019).

**There are also many regional political and practical challenges to be overcome.** In Brazil, given the practical difficulties of monitoring performance, high transaction costs have become the main challenges to providing green loans for REDD+ Payments for Performance (Edwards, 2018). In Asia, the Emissions Trading System (ETS) is only partially established in the carbon market and no specific institution is in charge of carbon trade management (Shi, Paramati and Ren, 2019).

## 5.4Leveraging private investment in forestry and biodiversity finance

**As the volume of public finance is limited, there have been attempts to use it to leverage private investment in forestry and biodiversity, but the amount leveraged globally to date has been limited.** GEF is one of the multilateral financing mechanisms that consistently tracks the amount of finance provided by other sources together with GEF grants (co-finance). While co-financing may not be counted directly as leveraged private finance, the GEF grant is accompanied by other financiers from both private and public sources (Projects, undated).

According to a recent report from GEF,5 across the GEF-7 portfolio, for each dollar of GEF project financing, an indicative $7.8 of co-financing is provided. The share of this co-financing provided by the private sector has been steady at around 16-18% of the total co-finance over the previous replenishment periods. According to the report, in GEF-7 "45% of all projects and programs include some level of private sector co-financing and the

[5] Progress Report on the Implementation of the Updated Co-Financing Policy. Global Environment Facility (November 2020).

indicative level of this co-financing amounts to US$ 3.6 billion, which presents substantial increase from the GEF-6 confirmed private sector co-finance US$ 2.7 bn". However, private sector co-financing is relatively low in the biodiversity and land degradation focal areas compared to the chemicals and waste and climate change focal areas.

**Besides GEF, the CBD's Global Partnership for Business and Biodiversity exchanges information and practice on mainstreaming biodiversity into the business sector.** There are currently 21 national and regional initiatives to collaborate on enhancing business participation in biodiversity-related issues (CBD Secretariat, 2020).

**There are other initiatives to boost private investment from NGOs and the private sector.** In 2011, the World Resources Institute (WRI) initiated the WRI Markets and Enterprise Programme (MEP), Institutions and Governance Programme (IGP) and Climate and Energy Programme (CEP) to increase the effectiveness of public climate finance by encouraging the flow of private capital to developing countries through the development of finance institutions, public-private partnership funds and initiatives, and bilateral climate finance frameworks (WRI, 2013).

**To unlock opportunities, the Forest Trends Public-Private Finance Initiative is developing new approaches to increasing funding for forest-related efforts.** Some examples are projects in Brazil and Peru connecting zero-deforestation certification and land-use commodities (Forest Trends, undated). **Table 8** shows several private investment initiatives seeking to halt deforestation and biodiversity loss with global outreach.

In addition to the global initiatives above, there are initiatives in developed countries that take a regional and/or national approach, such as the Biodiversity in Good Company Initiative in Germany, Entreprises pour l'Environnement (EpE) in France, the EU's Business and Biodiversity Platform, and the Japanese Business Initiative for Biodiversity (CBFF, undated; African Development Bank Group, undated; Biodiversity in Good Company, undated; EPE, undated; JBIB, undated; SADC, undated; European Commission, 2017).

### Table 8: Private investment initiatives to halt deforestation and biodiversity loss

| Example initiative | Description |
|---|---|
| Coalition for Private Investment in Conservation (CPIC) | Develops portfolios on successful conservation projects to connect with potential investment |
| Consumer Goods Forum | Initiated and implemented the Sustainable Supply Chain Initiative (SSCI) to achieve zero net deforestation in 2020 |
| Dutch Association of Investors for Sustainable Development (VBDO) | Engages with companies through seminars and conferences to share information about sustainable investment and business practices |
| Eurosif | Collaborates with Europe-based national sustainable investment forums (SIFs) to promote sustainable and responsible investment |
| Good Growth Partnership | Focuses on reducing deforestation and enhancing sustainable development in soy, beef and palm oil supply chains |
| Investor Initiative for Sustainable Forests (IISF) | IISF is initiated by a non-profit organisation, Ceres, which assists companies with sourcing commodities that do not involve deforestation |
| UK Sustainable Investment and Finance Association (UKSIF) | Promotes sustainable growth and responsible finance in the UK by informing, influencing and connecting relevant stakeholders in the financial system |

Source: UKSIF, undated; Good Growth Partnership, undated; African Development Bank Group, undated; Ceres, undated; Eurosif, undated; SADC, undated; the Consumer Goods Forum, undated; VBDO, 2018)

**Although investment in nature conservation continues to grow in both developed and developing countries, a report from OroVerde and the Global Nature Fund shows that there are still too few projects related to biodiversity.** Impact investment, which focuses not only on risk-return but also on social and ecological impacts, is an alternative source of finance that is still in its infancy with limited evidence of scalable impact (Mannigel, Klimpel and Peiffer, 2017).

**Assessing the source of funding from the UK, the monitoring framework for UK International Climate Finance measures the volume of funds from both public (KPI 11) and private sources (KPI 12) that are mobilised for climate change purposes.** An example of a UK programme that aims to leverage private investment is Partnership for Forests (P4F). It channels investment, mostly from the private sector, for projects related to sustainable forests and land use. P4F provides fair return and risk for the private sector, public sector and communities (Partnerships For Forests, undated). As per October 2020, £244 million in private investment has been mobilised to fund projects in 17 countries with 67 partnerships focusing on forests (FCDO, 2021). Another initiative to leverage private investment is the establishment of the UK Sustainable Investment and Finance Association (UKSIF). UKSIF actively promotes sustainable growth and responsible finance in the UK by informing, influencing and connecting relevant stakeholders in the financial system.

# 6. Global approaches to halting deforestation and preventing irreversible biodiversity loss

## 6.1 Approaches, challenges and 'what works'

**Practitioners and policymakers utilise a wide range of approaches to halt deforestation and biodiversity loss.** This section presents some of the most commonly used approaches and a short explanation of their theory of change – or how the implementation of these approaches is expected to lead to reduced deforestation and protection of biodiversity. Four overall groupings of approaches are presented. First, nature-based solutions (NbS) include a range of approaches including protected areas, REDD+, payments for environmental services, land-use planning and moratoria, community-based natural resource management, jurisdictional approaches and sustainable agricultural intensification. A second cluster of approaches involves voluntary commitments by the private sector around specific commodity chains, including systems of certification as well as company commitments on zero-deforestation. A third group involves regulatory and policy measures on the actions of companies trading in forest and forest-risk commodities and includes public procurement reforms, import regulations and due diligence requirements. Finally, an area of growing interest is sustainable finance, and includes the introduction of sustainable finance regulations ('greening finance') and the promotion of financial instruments that support green investments ('financing green'). This section summarises evidence from the literature on the effectiveness of these approaches.

**In many cases, the evidence is still emerging or remains insufficient to draw generalisable conclusions.** Wide variations in the findings of studies and evaluations suggests both uncertainties in how to measure results and that effectiveness is strongly influenced by contextual factors and/or variations in intervention design. There are few counterfactuals available in the evaluative literature, which means causal claims must be treated with caution.

### 6.1.1 Nature-based solutions and payments for ecosystem services

**Nature-based solutions (NbS) seek to provide benefits for both human well-being and biodiversity by working with nature.** Nature-based solutions are defined by the IUCN as "actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges (e.g. climate change, food and water security or natural disasters) effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits" (Cohen-Shacham, Walters and Maginnis, 2016, p. xii). Broad in scope, NbS include mainstreaming nature into governance policy and instruments, regional and international cooperation, valuing nature through governance and finance, and mitigating, adapting and building resilience to climate change (Nature-Based Solutions (NBS) Facilitation Team of the 2019 UN Climate Action Summit, 2019). NbS are often contrasted with technical solutions that provide only one benefit (Dasgupta, 2021).

**Interest in NbS has rapidly increased in both the private and the public sector over the past five years** (Seddon et al., 2019; Lang, 2020). The private sector has embraced NbS as a mechanism that both contributes to climate, biodiversity and deforestation issues and brings financial benefits through carbon farming, increased value from certified commodities, green bonds, forest insurance and carbon off-taker guarantees (Vivid Economics, 2020a). Both the aforementioned report and another commissioned by the UN's Principles for Responsible Investment

(PRI) frame natural forest restoration as an 'easy' and 'low-cost' opportunity for investors, projecting annual revenues of up to $190 billion by 2050. Another expected growth area in these reports is avoided deforestation, which is projected to generate annual revenues of up to $610 billion by 2050 (Vivid Economics, 2020b). Its advocates argue that rewilding and reforesting are the most effective way of restoring carbon and protecting biodiversity (Lewis et al., 2019; Perino et al., 2019).

Broadly, NbS is an extension of the Payment for Ecosystem Services (PES) approach (Babí Almenar et al., 2021), which **some argue has become associated with immediate tangible benefits (such as conditional cash transfers) and is therefore more limited** (Eggermont et al., 2015; see also Ferraro and Simorangkir, 2020). A recent article on PES suggests "the original vision of PES as being direct, flexible, and potentially effective remains valid, but PES design and implementation have to be upgraded in their economic functioning to better realize this potential. Adverse self-selection, inadequate administrative targeting, and ill-enforced conditionality constitute three key obstacles that may considerably hamper PES success" (Wunder et al., 2020).

**The effectiveness of the PES approach is therefore highly variable, with the opportunity costs being the main constraint** (Romero, 2012). Others have highlighted problematic notions of what 'fair' compensation and payments means in different contexts (Loft et al., 2020). Proponents of NbS argue that its main advantage over ecosystem services and other attempts to protect forest and biodiversity is that it emphasises well-being and livelihoods in human interactions with nature (Eggermont et al., 2015).

**There have been some examples of broadly successful PES initiatives at both national and local scales.** The government of Costa Rica has been operating PES schemes for more than 20 years. The mechanism was used as part of a much wider set of environmental policy instruments in a country with relatively few indigenous land claims (Wallbott, Siciliano and Lederer, 2019). PES paid landholders for reforestation efforts to meet national reforestation targets (Wunder, 2005). Costa Rica's national PES system is often cited as a successful initiative that has worked at scale to protect forests rich in biodiversity that provide a range of ecological and ecosystem services. Further, there were specific mechanisms in place that were particularly suited to smallholders and marginalised populations (Brownson et al., 2020). The country's PES system has, however, been subject to critique, especially around the privatisation of conservation and reforestation efforts (Matulis, 2013).

Vietnam has also been highlighted as an example of a successful PES initiative in terms of distribution of cash for environmental provisioning. However, when broader perspectives are applied, it appears that there was a weak relationship between PES and forest protection in Vietnam, with evidence of further entrenchment of state dominance in forest areas, and no clear evidence of benefits to the poor (Sikor and Cầm, 2016; To and Dressler, 2019). Others argue that the strong state-centred approach to PES in Vietnam ensured that it avoided some of the pitfalls common in other PES initiatives, but despite this, it was still unable to address the underlying causes of deforestation such as land tenure insecurity and engagement of local communities in conservation (McElwee, 2012).

NbS aims to overcome some of these issues, and four types of NbS are examined in the following sub-sections: REDD+, protected areas, land-use planning and moratoria, and community-based natural resource management.

### *Reducing Emissions from Deforestation and Forest Degradation (REDD+)*

**An NbS approach that has been well studied and attracted significant interest among decision-makers over the past ten years is REDD+.** REDD+ proponents call for an investment of £13 to £21 billion (FAO, 2018). Born out of the 2007 UNFCCC Conference of the Parties in Bali, REDD+ aims to reduce forest degradation and deforestation while promising benefits to local communities whose lives are intimately involved with forests. The basic idea of REDD+ is that "more carbon is sequestrated and stocked in tropical forests by improving their conservation, management, and sustainable use, thus contributing to mitigating climate change" (Arts, Ingram and Brockhaus, 2019, p. 1). Although earlier versions of REDD were focused on carbon markets, its proponents have adopted a broader range of objectives relating to forest governance and land-use change, in part because the emergence of carbon markets at a sufficient scale has been elusive (Arts, Ingram and Brockhaus, 2019; Milne et al., 2019). Seen by policymakers as a 'new' and innovative tool for addressing forest loss, other authors suggest

that REDD+ follows similar a logic to its predecessors in which the promise of benefits has become its main commodity (Lund et al., 2017, p. 124; see also Svarstad and Benjaminsen, 2017).

A review of 45 articles looking at the outcomes of REDD+ interventions on the ground argues that these projects achieved **moderately encouraging results on carbon/land-use outcomes, but insignificant results on local people's well-being** (Duchelle, Simonet et al., 2018). Others have argued that while REDD+ has supported sustainable land-based investments, its proponents struggle to compete with 'business as usual' incentives to convert forests, and have still not created the institutional conditions or mobilised sufficient finances to unlock its potential to trigger transformative actions on a large scale (Bastos Lima et al., 2017). In Indonesia, one of the largest recipients of funds designated for REDD+, initiatives have been plagued by financial limitations, community conflicts, boundary determination and enforcement struggles, weak monitoring, logic inconsistent with local realities, and the absence of markets that are conducive to alternative land-use practices (McGregor et al., 2015; Enrici and Hubacek, 2018; see also Arts, Ingram and Brockhaus, 2019; Asiyanbi and Massarella, 2020).

As REDD+ has shifted its focus to 'what works', proponents have increasingly focused on governance issues and mapping of forest resources (Pettenella and Brotto, 2012; Mulyani and Jepson, 2017; Milne et al., 2019). This has led to initiatives such as Indonesia's One Map policy, which aims to delineate many conflicted boundaries, both jurisdictional and land-use (McGregor et al., 2015; Mulyani and Jepson, 2017). In the case of Scolel Té, in Chiapas, Mexico, **successes were found on degraded lands on which local people had few livelihood options.** The initiative is the longest-running ecosystem services project in the world and traded the first voluntary carbon credits (Plan Vivo, undated). The initiative paid farmers for tree-planting activities in local agro-ecological (mixed-use agricultural and ecological) landscapes. Although carbon payments were not found to be significant for farmers' incomes, and benefits were not distributed evenly among local people, there were other livelihood benefits for farmers and a high degree of participation of local people in decision-making through improved local land-use governance structures (Hendrickson and Corbera, 2015). Furthermore, the project engages with traditional Taungya agricultural systems to ensure cultural relevance for the intervention (Plan Vivo, undated; Soto-Pinto et al., 2009).

### *Protected areas*

**Protected areas cover a range of ecosystems and most commonly take the form of national parks or nature reserves.** Human activity is minimised or managed and biodiversity conservation objectives are delivered by dedicated protected area staff. Protected areas cover a range of different types, from those that are driven by strict conservation objectives, with little or no local use or access by local communities, to models which support much greater local involvement in management, protection and use.

With regard to conservation of biodiversity, state-managed protected areas are one of the most common tools used globally and have been shown to have positive impacts (Gillingham et al., 2015; Thomas and Gillingham, 2015). However, limited coverage and changing national government policies have been shown to limit effectiveness (Mokany et al., 2020). **The trade-offs made in national policies between demands for economic growth and less profitable, long-term conservation strategies are unstable, subject to shifting national leadership and priorities** (Golden et al., undated). Furthermore, poorer countries are unable to allocate sufficient staffing and financial resources to effectively protect and police protected areas in many parts of the world, leading to the concept of 'paper parks' (Brandon, Redford and Sanderson, 1998). There is also a growing literature on the negative impacts that protected areas have had on local livelihoods, particularly when they result in evictions of people with customary or ancestral claims to these areas (Brockington, Duffy and Igoe, 2008; Ramutsindela and Sinthumule, 2016). Violent evictions and exclusions in the name of forest conservation in Colombia (Ojeda, 2012; Eichler and Bacca, 2020), Ghana (Bukari and Kuusaana, 2018; Asaaga and Hirons, 2019; Kansanga, Arku and Luginaah, 2019), and Indonesia (Myers and Muhajir, 2015; Astuti and McGregor, 2016; Howson, 2016; Dhiaulhaq and McCarthy, 2019) have excluded local and indigenous peoples from customary territories and/or tracts of forestland that are critical to their lives and well-being. Even parks touted as successes have been subject to critiques of injustice against local communities and diminished quality of life for those living

in and near protected areas, such as the Bwindi Impenetrable National Park, in which successes in gorilla preservation and distributive notions of justice[6] and cash sharing have overshadowed customary land claims, equitable access to benefits, and recognition of local and indigenous people (Flora Lu Holt, 2005; Martin, Akol and Gross-Camp, 2015).

A study of protected areas in Nepal, Thailand and China found **a marked difference in the effectiveness of the conservation efforts when local and indigenous people participate meaningfully in the management and decision-making around the protected area** (Nepal, 2002; see also Gavin et al., 2018; Artelle et al., 2019). The Global Assessment Report on Biodiversity and Ecosystem Services found that indigenous people play a key role in the effectiveness of protected areas and while many protected areas put indigenous people at a disadvantage, examples in which local knowledge is integrated into management and decision-making yield better conservation results (IPBES, 2019b).

### *Land-use planning and moratoria*

**Land-use planning and moratoria on particular forms of land use are other widely applied forms of NbS.** Integrated land-use planning is a process that engages stakeholders from various sectors, taking into account the different uses, demands and activities in the landscape and including these users in any decisions relating to them. It aims to enable different stakeholder groups to achieve their goals with minimum conflict and enhanced benefits for society, the economy and the environment (García-Rangel et al., 2017). Integrated land-use planning is among a number of vital elements that can help to address some of the barriers to scaling up zero-deforestation commitments, such as political commitments from government actors, availability of appropriate finance, and technological tools to support effective monitoring. Integrated land-use planning can help move zero-deforestation commitments from single actors to whole supply chains or landscapes. As noted by Taylor and Streck (2018), "corporate actors cannot stop deforestation on their own." Integrated land-use planning brings together different actors – public and private – whose actions affect the management of land and forests. It can provide a framework for negotiating the allocation of land, accommodating production, management and conservation, and identifying common goals. This can help to establish corporate commitments, scale up a commitment into a deforestation-free jurisdictional approach, or determine how commitments could best be implemented to optimise gains for the landscape.

State moratoria on certain forms of land use are commonly applied in countries aiming to strengthen policies relating to deforestation, such as Indonesia. In 2011, Indonesia issued a moratorium on new permits for two of the major drivers of deforestation in the country: oil palm and timber plantations in primary natural forests and peatland. Positive effects of moratoria have been found by some (such as Chen, Kennedy and Xu, 2019) but questioned by others in studies that show how the complexity of land-use change calls into question its effectiveness. This is often due to a lack of knowledge and data on land-use changes by government officials, combined with pressure from private sector actors to convert forests to agricultural plantations (Austin et al., 2014; Suwarno et al., 2018; Lim, Carrasco and McHardy, 2019). A study in Brazil showed that the Amazon Soy Moratorium reduced deforestation by 0.31 to 0.98% (Heilmayr et al., 2020).

### *Community-based natural resource management*

Community-based natural resource management (CBNRM) covers a range of approaches, with the most commonly applied being community forest management. **Community forest management involves a range of forest governance arrangements, from usage rights to local forest users' formal ownership for the purposes of conservation and the production of timber and non-timber forest resources.** In Indonesia, implementation of the state's formal programme for the acceleration of social forestry has been impeded by historically problematic enclosures and bureaucratic land administration processes (Fisher et al., 2018). Community-based wildlife management has been implemented across many countries in Eastern and Southern Africa as a means to

[6] Distributive justice focuses on the fair distribution of both the burdens and the benefits of social cooperation among diverse people with competing needs and claims (see Kaufman, 2012, link).

support conservation of wildlife and ensure that benefits from conservation (and associated tourism revenues) are shared more equitably with rural communities (Roe, Nelson and Sandbrook, 2009). CBNRM is based on the principles of common property resource management developed in the 1980s, which emphasise the transfer of natural resource tenure rights to representative community institutions on the assumption that this will deliver better conservation as well as poverty-alleviation outcomes (Ostrom, 1990).

When management responsibility for areas rich in biodiversity is devolved to local communities and indigenous peoples, there is a growing body of evidence that indicates positive conservation outcomes, when compared with open-access or 'business as usual' (BAU) scenarios (Bray et al., 2008). However, if these conservation benefits are to be maximised, transfer of legal tenure rights to local communities must be complemented by organisational capacity building and incubation of viable and sustainable community-based economic activities (Humphries et al., 2020).

Furthermore, positive outcomes are also achieved in terms of strengthened and more resilient local livelihoods (Porter-Bolland et al., 2012). Probably the most comprehensive data on the impact of a community forestry programme in any country comes from a large-scale survey carried out in Nepal by the Ministry of Forest and Soil Conservation (MFSC, 2013) after 35 years of community forestry. It showed that in total, Forest User Groups in Nepal generate about $49 million per year from managing their community forests. Pandit, Neupane and Bhattarai (2014) reported that income from community forests makes up 26% of total household income. About 80% of the forest-related income is derived from timber sales. However, a number of reviews of community forestry programmes claim that local elites capture a disproportionate share of the benefits arising from forest management, which may undermine its 'pro-poor' potential (Iversen et al., 2006; Kamoto et al., 2013; Lund and Saito-Jensen, 2013).

In Indonesia, while the state has a formal programme to accelerate social forestry, implementation has been **impeded by historically problematic enclosures and bureaucratic land administration processes** (Fisher et al., 2018). A study in Indonesia has shown that **community forest management reduced deforestation upon initial implementation, but over time the results have been more variable** (Boedhihartono, 2017). In Ghana, there remains a strong role for traditional authorities in forest management, which may or may not be affirmed through legislation (Adjei, Agyei and Adjei, 2020).

A recent literature review of 643 cases of community forest management initiatives in 51 countries found generally positive environmental and livelihood results; however, forest access and resource rights were often compromised (Hajjar et al., 2020). This concurs with Wong et al. (2020), who show that different notions of equity have emerged among forest actors in Southeast Asia. There is insufficient data to reveal the differences between biodiversity loss in community-managed and state-managed forests (see Boedhihartono, 2017, on Indonesia). Furthermore, there are concerns in the literature that market-driven aspects of community forestry (in other words, the community business plan required for many production forests) leave initiatives vulnerable to changes in market preferences while also often operating with constrained harvesting quotas (Terborgh and Peres, 2017). Other scholars argue that the focus in Indonesia, where the government's target is social forestry schemes covering a total of 12.7 million hectares, incentivises excessive bureaucracy and permit application processes rather than capacity building and monitoring and evaluation (Erbaugh, 2019). Concerns around the equity of benefit sharing and burdens from community forestry are pervasive in the literature (McDermott and Schreckenberg, 2009).

A meta-study of community forestry encompassing 69 case studies found that **the most successful implementations of community forestry were those that made provisions for "tenure security, clear ownership, congruence between biophysical and socioeconomic boundaries of the resources, effective enforcement of rules and regulations, monitoring, sanctioning, strong leadership with capable local organization, expectation of benefits, common interests among community members, and local authority"** (Pagdee, Kim and Daugherty, 2006, p. 33; see also Bong et al., 2019).

### *Jurisdictional governance*

**Another recent approach to addressing deforestation focuses on jurisdictional levels of governance.** Jurisdictional or landscape approaches promote transitions to more sustainable and inclusive low-carbon economies in a defined area, often at the subnational level. Key actions include supporting public-private partnerships, de-risking finance schemes, advancing land-use planning, clarifying tenure and supporting land conflict resolution, facilitating wider uptake of sustainability practices and clarifying responsibilities of government bodies at the jurisdictional level (Pachecho, 2021). Jurisdictional approaches have been gaining attention in Indonesia since 2014, stimulated by challenges raised in REDD+ and other more conventional programmes and complementing zero-deforestation approaches (Taylor and Streck, 2018; Seymour, Aurora and Arif, 2020). The aim is to integrate landscape management with policy-relevant boundaries to facilitate effective policy- and decision-making (Daemeter, 2017; Stickler et al., 2018). Jurisdictional approaches therefore lend themselves well to incorporating the other approaches mentioned in this document, such as REDD+ and zero-deforestation commitments (Meyer and Miller, 2015).

While still in the early stages of implementation, initiatives that engage a wide range of interested actors in consultation, planning and decision-making are showing some early successes in terms of reduced deforestation, citizen engagement and other benefits (Duchelle, Seymour et al., 2018; Stickler et al., 2018; Wunder et al., 2020). Jurisdictional approaches can be combined with any of the other approaches mentioned above to ensure that the scale of a project is such that all relevant actors are involved and in a position to benefit (Boyd et al., 2018; see Wunder et al., 2020). **Jurisdictional approaches stand out as general enough to permit different approaches and perspectives, but specific enough to apply at policy-relevant levels of governance.** They also provide an opportunity for meaningful engagement of a wide range of stakeholders (Colchester et al., 2020; Seymour, Aurora and Arif, 2020; Wunder et al., 2020). The focus that these approaches place on both policy setting and the inclusion of multiple actors shows promise to address many of the implementation gaps in efforts to halt deforestation and biodiversity loss. Sayer et al. (2017) found that landscape approaches, which are closely related to jurisdictional approaches, have been effective in achieving a balance among multiple objectives.

In Colombia, there is an intersectoral commission that deals with climate change using jurisdictional approaches, and an intersectoral commission that oversees deforestation and forest protection matters was created in 2017 (Gobierno de Colombia, 2019). Furthermore, the commission includes an implementation strategy for actions to reach the regional (subnational) and national levels (Gobierno de Colombia, 2019). In Indonesia, there are a range of REDD+ and community forestry initiatives that have embraced jurisdictional approaches, which have **successfully brought multiple actors together to find solutions to halting deforestation that work for a broad range of actors** (Seymour, Aurora and Arif, 2020).

Jurisdictional approaches have produced early indications of success, but the question of which options within the approach are likely to be most effective is not yet resolved (WWF, 2017).

### *Sustainable agricultural intensification*

Sustainable agricultural intensification is defined as a process or system where agricultural yields are increased without adverse environmental impact and without the conversion of additional non-agricultural land (Pretty and Bharucha, 2014). This approach recognises the impact of land-extensive systems of agriculture on deforestation and biodiversity loss across much of the tropics (Austin et al., 2019; Jayathilake et al., 2020). Agricultural intensification approaches have been critiqued as a strategy to halt deforestation due to the effects that they have on increasing land rents, the additional incentives that they might create for land-use conversions to high-output agricultural systems, and spillover effects on adjacent soils (García-Barrios et al., 2009; Phelps et al., 2013; Didham et al., 2015; Garrett et al., 2018). At best, short-term reductions in deforestation have been observed, but long-term results are dubious, as shown in Brazil (Garrett et al., 2018). Others demonstrate that agricultural intensification benefits those with secure land tenure, thereby excluding many of the poorest farmers from realising its benefits, as shown in Indonesia. (Krishna et al., 2017; Kubitza et al., 2018).

*Alternative livelihoods*

The promotion of 'alternative livelihoods' has long been used as a strategy for reducing local-level threats to species, habitats or resources of conservation concern. For example, the provision of alternative protein and income-generating sources to bushmeat hunters is one of the most widely used strategies aimed at reducing bushmeat consumption and trade by local people. In general, however, they can be understood as an approach to achieving biodiversity conservation by substituting a livelihood strategy that is causing harm to a biodiversity target – for example, through unsustainable use – for one that has a lesser, or negligible, impact on the same target. In some cases this might mean providing an alternative resource to the one that is being exploited. An example is encouraging local people to farm cane rats as a source of protein rather than hunting bushmeat. In other cases, the focus of a project might be providing an alternative occupation or source of income. Examples include craft-making or beekeeping as substitutes for expanding subsistence agriculture around protected areas, or seaweed farming as an alternative to artisanal fishing. Despite the widespread and enduring nature of alternative livelihood projects, there is surprisingly little evidence pointing to their effectiveness (Roe et al., 2015). A key problem relates to the design of such interventions and the implicit assumptions made regarding the links between human behaviour and conservation outcomes – and in particular, the degree to which viable 'alternatives' can fully substitute natural resource-based livelihood activities (Wright et al., 2015)

### 6.1.2 Voluntary commitments around agricultural commodity value chains

Internationally agreed commodity-specific standards and certification are increasing in use across a number of agricultural and forestry production systems around the world, including palm oil (eg Roundtable on Sustainable Palm Oil), soya (eg Roundtable on Sustainable Soya), coffee (eg Rainforest Alliance) and timber (eg Forest Stewardship Council). Such systems are subject to the inclusion of standards specifying the avoidance of environmental and social impacts and usually require independent verification by an external accredited auditor, increasing the legitimacy of the label. In recent years there has been steady growth in certified area and volume for soybean, oil palm, coffee and cacao in countries experiencing high deforestation (Takahashi and Todo, 2017; Garrett et al., 2018; RSPO, 2020). The effects of these initiatives on deforestation have been unclear. A comprehensive study of oil palm certification in Indonesia showed that RSPO certification had no causal impact on forest loss (Carlson, Heilmayr and Gibbs, 2018). Another study of palm oil, soy and cocoa sectors in Brazil, Indonesia and Côte d'Ivoire also showed negligible impacts of certification on forest loss (van der Ven, Rothacker and Cashore, 2018). A recent study showed that oil palm certification led to deforestation spillovers by incentivising adjacent development of agricultural expansion (Heilmayr, Carlson and Benedict, 2020).

Zero deforestation is a voluntary standard that companies adopt to ensure that their supply chains do not involve deforestation (Garrett et al., 2019). The concept began to gain traction at the 2010 Cancún Climate Summit and has been increasing in popularity among corporations ever since (Lister and Dauvergne, 2014). Zero-deforestation commitments are voluntary policies made by companies to eliminate deforestation from their supply chains (Lake and Baer, 2015). Commitments are not explicitly subject to any standards and are controlled and reported by the companies themselves, leading many observers to question their impact (Boucher, 2015; Taylor and Streck, 2018). **Zero-deforestation pledges are best made in close collaboration with governments,** as Furumo et al. (2020) show in the case of Colombia. It is important to note, though, that Colombia's deforestation strategy (EICDGB) includes the goal of reducing carbon emissions by 20% (with respect to the BAU scenario) by 2030 (Gobierno de Colombia, 2019). Furthermore, **NGOs lend legitimacy to company efforts** (Lister and Dauvergne, 2014). As in NbS and trade-based solutions, unwanted trade-offs, full transparency and overreliance on central powerbrokers that eschew the opinions of local forest users and marginalised groups all need to be monitored (Jopke and Schoneveld, 2018).

Public concern over the growing impact of agricultural commodities on deforestation has prompted a groundswell of business initiatives in the form of codes of conduct and public pledges of zero deforestation in supply chains. More than 480 companies had made 850 commitments as of 2019, with beef, soy, palm oil, pulp and paper, and natural rubber sectors being the main focus, underscoring the popularity of the approach (Pacheco et al., 2018). In West Africa, recognition of the growing impact of the rapidly expanding cocoa sector on forests and biodiversity led to some of the world's leading cocoa companies launching the Cocoa and Forests

Initiative (CFI) in November 2017 (Kroeger et al., 2017). Central to this initiative is a commitment to prevent any further conversion of forestland for cocoa production.

In instances where certifications of forest products and agricultural commodities are recognised as drivers of deforestation, **successes have been found in taking a broader governance approach.** Savilaakso et al. (2017) study timber certification schemes in Cameroon, Indonesia and Peru. They found that certification schemes had the potential to influence policy and governance arrangements and slow deforestation.

### 6.1.3 Regulatory approaches around commodity chains and trade

A third group of approaches involves the implementation of regulatory and policy measures on the actions of companies trading in forest and forest-risk commodities. This not only recognises the fact that voluntary approaches (described above) are only effective on companies exposed to markets with strong consumer demands for sustainability (such as Europe and North America), but also the fact that implementation is lagging behind public commitments. The EU Forest Law Enforcement, Governance and Trade (FLEGT) initiative uses demand- and supply-side measures in both consumer and producer countries to regulate the trade in legal timber. Several countries have implemented regulations to ensure that imported timber and wood products are not the result of illegal logging, which could indicate that protected forests have been cleared and/or unsustainable logging methods used. Japan, Australia, the US and the EU (which included the UK at the time) have all developed regulations that require varying degrees of verification of the legal origin of timber at the point of import. The EU's FLEGT initiative is the largest such system and depends upon the EU Timber Regulation in prohibiting the import of unverified timber and wood products and Voluntary Partnership Agreements (VPAs) with exporting countries. The exporter's timber legality verification system must be accepted by the EU before issuing FLEGT certificates, so that no further due diligence is required by upstream actors for these imports.

Within the context of producer countries, FLEGT initiatives are characterised by multi-stakeholder, deliberative processes designed to build consensus and public decision-making around legality definitions and enforcement. The use of international trade as a lever for addressing deep-seated governance failures within the timber sector and respect for national sovereignty and legal frameworks developed, but with the expectation that agreed legal frameworks and reforms are enforced (Overdevest and Zeitlin, 2014). To date, Indonesia is the only country to have achieved this status (since 2016), although Ghana and 12 other countries are at various stages of negotiation towards the implementation of VPAs (EU, 2019). More recently, the EU and the UK government have been exploring policy options designed to reduce the import of food commodities responsible for deforestation through the introduction of due diligence requirements.

There have been positive implications for forest governance due to FLEGT. Some studies suggest that **illegal logging rates have reduced in Indonesia due to improved planning processes,** the industry is better organised, timber is more traceable than ever before and legal frameworks and enforcement of the law have improved (Cerutti et al., 2020). Studies have also found that it has further **entrenched the positions of elite actors in the commodity chain** (Maryudi and Myers, 2018). According to Cerutti et al. (2020), in the cases of Indonesia and Ghana, the two countries that have been engaging with FLEGT the longest, there has been a decrease in illegal logging rates, especially in production forests that are mandated to have a management plan. Public forums for discussion on forest management have improved under FLEGT, strengthening local governance on forest management. The authors also argue that women and youth are better represented in governance discussions as a result of FLEGT. The shift in global markets from Europe to China has limited the potential trade leverage from Europe-centred FLEGT reforms and has necessitated greater engagement with emerging markets such as China (Overdevest and Zeitlin, 2014)

At a global level, a number of international agreements and conventions exist to protect biodiversity and regulate trade in endangered species. One of the longest-standing international trade agreements to protect biodiversity is the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which entered into force in 1975 and has 183 country signatories (CITES, undated b). The Convention lists 38,700 species (CITES, undated a) and restrictions to their import and export, to which its signatories agree. **There is little doubt in the literature that CITES has had an effect on international trade in the listed species, although effectiveness is**

**hampered by the absence of strong independent monitoring and oversight** (Brown and Swails, 2005). Furthermore, it has been critiqued for perpetuating the power imbalance between the global North and South and state and non-state actors, especially in terms of whose voices are heard in the listing and delisting of species (Duffy, 2013; Challender and MacMillan, 2019; Gaffney and Evensen, 2020).

### 6.1.4 Sustainable finance

Despite the importance of forests in tackling climate change and other environmental damage, the funding needed to address the problem is falling far short of requirements (Climate Focus, 2017). Sustainable finance is broadly defined as any financial initiative, process, product or service that is designed either to protect the natural environment or to manage how the environment has impacts on finance and investment. It recognises that **finance flows continue to drive economic activity which contributes to the unsustainable use of natural resources.**

Sustainable finance promotes the inclusion and public disclosure of **environmental, social and governance (ESG) indicators** as a means to drive investment decision-making towards positive outcomes (WEF, 2020b). Two main approaches are currently being promoted: 'financing green', which promotes and supports new financial instruments that support green or sustainable investments (such as green bonds) and 'greening finance', which involves the introduction of environmental, social and governance risk reduction measures in mainstream financial flows, discussed in more detail below.

As business has benefited from economic growth, globalisation, increased consumption and fossil fuel supplies, it has reinforced and expanded its role as the major provider of goods, jobs and infrastructure worldwide. As such, its contribution to critical sustainability topics like climate change, biodiversity and deforestation has also grown. At the same time, the rise of new technology has ensured that stakeholders, not just shareholders, are now able to challenge businesses' behaviour. As a result, transparent measurement and disclosure of sustainability performance are now considered to be a fundamental part of effective business management, and essential for preserving trust in business as a force for good. There has been a groundswell of demand to understand the connection between sustainability topics and financial risk and opportunity, along with the contribution of business to achieving the Sustainable Development Goals (SDGs). In August 2019, the US Business Roundtable outlined the purpose of a corporation as to promote "an economy that serves all". A few months later, the World Economic Forum (WEF) updated its Davos Manifesto, claiming that, for a private company, "performance must be measured not only on the return to shareholders, but also on how it achieves its environmental, social and good governance objectives" (WEF and Deloitte, 2020). In parallel to these developments, there have been moves towards increased regulation of the financial sector, led by the EU, which has formulated the Sustainable Finance Disclosure Regulation, building on a wide range of voluntary principles and standards. These new regulations aim to provide clarity concerning green investment claims in terms of what finance products promise and the impacts they actually deliver. These regulations are likely to increase the risks of investing in markets where governance in finance and natural resource sectors is weak.

The increased use of green credentials as a marketing tool, and consequent moves to regulate ESG finance, are likely to increase risks to firms providing finance to developing countries where ESG enforcement is weak. This is particularly the case for investments in producing forest-risk commodities, which is associated with widely acknowledged environmental and social issues. The 'big four' forest-risk commodities (palm oil, beef, soy and forest products), with the exception of pulp and paper, are largely financed without recourse to international markets, so more rigorous regulatory conditions or voluntary principles adopted in the developed economies may have limited effect on improving their sustainability (https://forestsandfinance.org). Change in developing countries must therefore come from stricter regulation of their own finance sectors concerning adequate assessment, monitoring and disclosure of ESG impacts. One such economy that has made important progress in this regard is Indonesia, which in 2017 published a national regulation on sustainable finance. The regulation requires financial institutions to develop a Sustainable Finance Action Plan (RAKB) and a Sustainability Report, both of which must be made publicly available.

## 6.2Participation and citizen engagement

**Effective engagement of citizens in efforts to halt deforestation and biodiversity loss has proved a challenge for international initiatives.** The extent to which citizens engage varies considerably among countries and across initiatives. Satyal (2018) examines citizen engagement and civil society participation in REDD+ and FLEGT processes in West Africa and finds that FLEGT, including in Ghana, demonstrates a higher level of engagement, which involves engaging actors along the value chain, including government, private sector and trade-based actors as well as CSOs. By contrast, REDD+ focuses more at the forest level, where the engagement of forest users has been more challenging. Some challenges in engaging forest users are the result of their historical relationship with the state and outsiders, as Li (2007) and Scott (2009) show in Indonesia. In Colombia, government policies can be contradictory: some policies impose investments and large-scale productions that cause deforestation and biodiversity loss to the detriment of communities (Gilbert, 2017), while others promote dialogue and consultation (Gobierno de Colombia, 2019).

While citizens' engagement in efforts to halt deforestation and biodiversity loss is an important consideration, ensuring the representation and participation of a broad range of actors is equally critical. The preamble to the Paris Agreement (UN, 2015 preamble) acknowledges that:

> *[...] climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity.*

**Much of the literature considers stakeholders' participation and ability to benefit from processes and projects, and secure recognition of their claims.** Dawson et al. (2018) examine the problems around the CBD's Aichi Target 11 understanding of 'effective and equitable management of protected areas'. They argue that definitions of equity focus on material distribution rather than recognition and representation, and that standardised indicators inhibit the accurate assessment of equity. Myers and Muhajir's (2015) research in Indonesia similarly finds that the ways that the state and international partners understood equity (in material terms) were significantly different to community understandings, which centred more on the recognition of customary land claims.

Garnett et al. (2018) used publicly available geospatial data to show that **indigenous peoples around the globe manage or have tenure rights to at least 38 million square kilometres of land in 87 countries, representing about 25% of all land on earth and 40% of all protected land area.** Furthermore, an estimated 80% of the Earth's biodiversity is within indigenous people's territory (IFAD, 2012). Collectively they are the largest stakeholder in the effort to halt deforestation and biodiversity loss. Although a heterogeneous group, indigenous peoples share a struggle for recognition and to have their voices heard and included in international efforts to reduce forest loss and protect biodiversity, which are often characterised by neo-colonial relations among and within states (Howitt, 2018; Domínguez and Luoma, 2020; Ogar, Pecl and Mustonen, 2020).

In Indonesia, Constitutional Court rulings in 2011 and 2012 compelled the Ministry of Forestry to recognise indigenous people's claims to forestland (Myers et al., 2017). However, by 2020, only 4.38 million hectares (about 13% of which is classified as customary forest) were under social forestry schemes, out of a total forest area of 120 million hectares (Republic of Indonesia, 2020). On the other hand, recognition of collective land tenure rights in Colombia has been considered among the strongest in Latin America: collective land tenure in Colombia covers almost 38 million hectares, including both land recognised as indigenous lands and collective lands of Afro-descendant communities. The recognition of indigenous and community rights is supported by the Constitution of 1991 (Arango, 2018). However, titling in Colombia has stagnated since the 1990s, facing challenges such as the "proliferation of other regulatory frameworks representing parallel interests in the access to and use of lands and resources, as well as of the accommodation of the interests of multinational private actors" (Ruiz, 2018, p. 1).

**Alongside the overall variability of citizens' engagement with efforts to halt deforestation and biodiversity loss, women have been systematically excluded from participating in both the processes and the sharing of benefits** (Adams, Oduro and Ansong, 2016; Arwida et al., 2016 in Indonesia; Husseini, Kendie and Agbesinyale, 2016 in Ghana; Bose, 2017 in Colombia; Larson et al., 2018). Arwida et al. (2017) found that REDD+ efforts in Indonesia had exacerbated gender inequalities and further entrenched the exclusion of women from decision-making and benefit sharing. Bose (2017), in Colombia, argues for efforts to address forest issues with greater consideration of women's perspectives, and to include gender issues in forest tenure security. While there have been several attempts to specifically address gender inequalities in the management of natural resources, the problem persists. Despite the growing realisation that one of the key factors behind successful community forestry lies in strengthening local-level forest management institutions, without deliberate efforts to address ingrained gender inequalities, seemingly participatory institutions may exclude key groups such as women (Agarwal, 2001; Agarwal, 2009).

# 7. The impact of deforestation and biodiversity loss on people

This chapter analyses the impact of deforestation and biodiversity loss on citizens and communities. As their impacts differ, we consider them in turn, in two sections. Section 7.1 considers the environmental, health and migration effects, while Section 7.2 looks at the impacts of efforts to halt deforestation and biodiversity loss on livelihoods and well-being, forest access, and governance.

## 7.1 Impacts of deforestation and biodiversity loss on people

### 7.1.1 Environmental impacts

**There is a clear scientific consensus that deforestation affects climate change, which is already affecting and will continue to affect the global population severely** (Oreskes, 2004; IPCC, 2014). Less attention has been paid to the local effects of deforestation and biodiversity loss on populations living in and near forest, despite this having been recognised for some time. In the 1970s, when fossil fuel prices surged, Eckholm (1975) raised concerns about the "other energy crisis – fuelwood". Wood fuel demand was seen to be outpacing sustainable supply, and catastrophic projections for year 2000 were presented in the form of a 'fuelwood gap', with devastating consequences for forests across large parts of Africa and, in particular, the Sahel (UN, 1980). Much of the initial justification and impetus for Nepal's national social forestry programme in the 1980s and 1990s was due to global concerns around an ecological crisis driven by deforestation in the Himalayan foothills and downstream consequences for countries such as Bangladesh which, as was argued at the time, was facing unprecedented risks from increased flooding and siltation (Hobley, 1996).

Deforestation can have severe impacts on the local environment including extreme weather, changes in precipitation patterns and surface drainage, and higher temperatures, increasing local citizens' vulnerability (Guimberteau et al., 2017; Tölle, Engler and Panitz, 2017; Winckler et al., 2019). Tropical deforestation results in the lasting degradation of topsoil and subsoil, affecting nutrient and carbon storage, resistance to erosion, and drainage and filtration, and it can take several decades for reforested land to recover even partially (Veldkamp et al., 2020). Other effects include reduced water quantity and quality. Mapulanga and Naito's (2019) study of the effects of deforestation on the supply of water to forest-adjacent communities found a 0.93% loss in access to clean drinking water for every 1% increase in deforestation. Furthermore, deforestation has clear implications for biodiversity loss: a study in the Amazon found a direct correlation between deforestation and biodiversity loss (Decaëns et al., 2018; and as discussed in Chapter 1 of this review).

### 7.1.2 Health and diseases

*Food and nutrition*

**The effects of global consumers' dietary preferences on deforestation and climate change are well evidenced** (Theurl et al., 2020). Less research has been done on forests as an important source of food and nutrition, especially for people in remote forest areas with low cash income (Rowland et al., 2017; Galway, Acharya and Jones, 2018). Forests are an important source of food, including plants and bushmeat, and offer a safety net for

millions of people living in and near them (Falconer and Koppell, 1990; Asprilla-Perea and Díaz-Puente, 2019; see also Tata Ngome et al., 2019; Dlamini, 2020). Hickey et al. (2016) used the Poverty-Environment Network (PEN) of around 8,000 households in 24 developing countries to study the contribution of wild foods to income and livelihoods. They found 77% of households to be engaged in wild food collection from forest and non-forest environments even though the share of wild food income in total household income was on average only 4%. Poorer households and households experiencing shocks derived higher income shares from wild foods. State land is the main source of forest-derived wild food income, while private lands are most important for non-forest wild food income. Considerable regional variation in determinants and the direction of significant relationships indicate there is no 'one size fits all' approach to integrating wild foods into food and forest policies.

The extent to which deforestation or biodiversity loss affects food and nutrition is under-researched. For many forest-reliant indigenous communities, large investments that lead to deforestation (such as oil, mining, plantations) deny them access to their primary source of livelihood and impact the biodiversity of their ancestral lands and territories (Gilbert, 2017).

### *Physical health*

**Some of the most salient recent effects of deforestation on health include haze from forest fires throughout the world. In many contexts, forest and peat fires are directly linked to deforestation** (Adrianto et al., 2019; Escobar, 2019). A systematic review of the health effects of haze from forest fires in Southeast Asia found an increase in respiratory morbidity that disproportionately affected children and the elderly (see also Koplitz et al., 2016; Ramakreshnan et al., 2018). Ramakreshnan et al. (2018) note the lack of evidence on the precise effects of haze-related toxicology on humans. What is clear is that the health effects are experienced not only by those living directly near forest areas but also by people in urban areas to which haze travels (Ramakreshnan et al., 2018).

**Apart from the direct impacts of haze from deforestation-related fires, the regional distribution and abundance of disease vectors are affected by forest and climatic change** (Müller et al., 2019). The main contemporary example is the strong link suggested in the literature between COVID-19, deforestation and biodiversity loss (Brancalion et al., 2020; Dobson et al., 2020; McElwee et al., 2020; Tollefson, 2020). Recent studies in Indonesia and the Amazon also point to increased cases of malaria related to deforestation (see also Burkett-Cadena and Vittor, 2018 for malaria and Zika; MacDonald and Mordecai, 2019; Chakrabarti, 2020). However there is no scientific consensus on the ways in which biodiversity affects disease at various scales (Rohr et al., 2020). Some studies suggest that biodiversity can reduce infectious disease burden through a 'dilution effect' by reducing the number of parasitic species per host, but other studies suggest no effect or an amplification. The summary by Rohr et al. (2020) of various meta-syntheses concluded that the relationship is likely to be non-linear, disease-specific and scale-dependent (that is, local effects may differ from ecosystem-wide effects). In some conditions, biodiversity conservation might lead to a reduction in zoonotic disease, particularly when accompanied by measures to reduce human incursion into protected areas. In other conditions, the management of particular species or habitats is likely to be more effective in controlling disease transmission than general biodiversity conservation (Rohr et al., 2020).

### *Mental health and spiritual well-being*

**Several studies find that biodiversity loss can affect mental health, suggesting that mental well-being is an underestimated benefit of natural spaces** (Lovell et al., 2014; Marselle et al., 2019). Spiritual beliefs that foster connection to forests and the biodiversity within them result in a respect for forest, often as a living entity rather than an object to be exploited (Gilbert, 2017; Irvine et al., 2019). Deforestation therefore affects this spiritual connection and, as a result, the spirituality of those who have lost forest.

### *Violence*

**Destroying the environment often involves violence against citizens living in and near forests and environmental defenders** (Butt et al., 2019). Uribe (2019, p. 886), in his work on roads and public spaces in the Colombian Amazon, stated that "while national governments have portrayed infrastructure development as greatly enhancing economic and geographical integration, critical approaches largely describe such

development as a destructive process of resource extraction and dispossession". Cases of large-scale production of food and biofuel involve physical harassment, intimidation and violence against indigenous peoples (Gilbert, 2017). Notably, Colombia was the deadliest country for environmental activists in 2019, according to a study made by Global Witness (2020).

### 7.1.3 Migration

**The 2018 Global Compact on Refugees recognises that "climate, environmental degradation and natural disasters increasingly interact with the drivers of refugee movements"** (UNHCR, 2018, para. I.D.). The literature on relationships between deforestation and migration focuses on the ways in which migration affects deforestation (see Darmawan, Klasen and Nuryartono, 2016 in Indonesia; Krishna et al., 2017; da Silva and Rodgers, 2018). While migration has long been a feature of communities living near and using tropical forests, contemporary patterns differ in size and scope, making migration central to understanding the past, present and future of forests and forest-based communities. Hecht et al. (2015) found that emigration does not necessarily lead to forest resurgence: in some instances lower population densities in forest areas lead to increased deforestation because of lower protections and new uses of the forest. Changing (and or varied) patterns of gender and age (across history and cases) among both migrant populations and those remaining in rural areas are essential to understanding the effects of migration on forests. Massive population flows between rural and urban areas are not only altering forest use and resource consumption through the 'urbanisation' of rural areas and populations, but also the 'ruralisation' of urban places and populations. Research shows that remittances have impacts on forest cover, on biodiversity and other forest characteristics, and on the use of forest products. These effects, however, have been shown to be highly variable.

## 7.2 Impacts of biodiversity and forest protection efforts on communities living in and near forests

### 7.2.1 Livelihoods and well-being

**Many community forest management initiatives, including some protected areas, zero-deforestation measures and trade conventions, include actions to improve the livelihoods and well-being of forest users, alongside improving biodiversity and reducing deforestation** (Eggermont et al., 2015; Erbaugh and Oldekop, 2018; Jopke and Schoneveld, 2018; Erbaugh, 2019). However, the impacts of such efforts on communities living near forests are highly variable and/or opaque (Adams et al., 2016; Gilmour, 2016; Fay and Denduangrudee, 2018). Buchy and Hobley (2018) reviewed the livelihood impacts of governance and legality reforms under FLEGT, and identified negative impacts on small-scale and informal producers, for whom the additional costs of formalisation and legal compliance were prohibitive, resulting in displacement and loss of livelihoods.

Larson et al.'s (2018) comparative study of 62 villages experiencing REDD+ initiatives and 61 control villages in Brazil, Cameroon, Indonesia, Peru, Tanzania and Vietnam found that overall well-being decreased in REDD+ villages compared to the control villages, and that women experienced a greater decline in well-being than men (see also Aggarwal and Brockington, 2020). The authors conclude that **REDD+ failed to achieve its objectives for women, or lacked them altogether.** A study in Colombia found that while women's livelihood and well-being interests were substantially different to those of men, with a greater focus on collecting non-timber forest products for food and nutrition, efforts to protect biodiversity and forests often focused on men's understanding of forest provisions (Cruz-Garcia et al., 2019). In Indonesia, Santika et al. (2019) found that community forestry programmes yielded few tangible results in terms of either conservation or poverty alleviation.

**Some reports in the literature offer promising results for livelihoods and well-being.** For example, Harbi et al. (2018) show that with training, an abundance of land and materials, and access to markets, local people in Indonesia can benefit from efforts to reduce deforestation. However, studies documenting their success often fail to analyse who benefits from the initiatives, with some authors showing that gains in well-being and livelihoods are often captured by elites (Gilmour, 2016).

*Security*

Howson (2018) shows how **REDD+ projects in Indonesia exacerbate violence related to the perpetuation of the image of farmers and smallholders as the perpetrators of forest degradation.** The article further elucidates the ways in which by REDD+ initiatives force smallholders out of their customary roles and into illicit livelihood activities, subjecting them to increased security risks. While violence against citizens in protected areas is well documented (Duffy, 2010; Ghazoul and Kleinschroth, 2018; Middeldorp and Le Billon, 2019), other efforts to halt deforestation and biodiversity loss also pose security threats to citizens living in and near forest. A global study of REDD+ projects finds many instances of human rights and security violations by proponents of halting deforestation and preventing irreversible biodiversity loss (Sarmiento Barletti and Larson, 2017). **The majority of victims of violence against forest defenders are also women** (Tran et al., 2020).

*Health and nutrition*

**Evidence suggests that exclusionary approaches to protecting biodiversity may have a negative effect on local people's nutrition,** as customary food sources may become unavailable due to the protection of particular species, especially in protected areas where community access to forest resources may be severely curtailed (Sylvester, Segura and Davidson-Hunt, 2016).

*Sacred and cultural spaces*

**Top-down measures to protect forests, for example by specifying permissible use of bounded tracts of land (a tradition often maintained by independent states) often conflict with customary views of land and forest as integral to the social lives of communities, and can be perceived by communities as neo-colonial** (Peluso, 1992 in Indonesia; Grove, 2017; Collins, 2019; Domínguez and Luoma, 2020; Erickson, 2020). Sacred forests have gained political importance in the fight against enclosure and deforestation, but remain excluded from boundary-setting and conservation efforts, again as shown in Indonesia (Undaharta and Wee, 2020).

### 7.2.2. Forest access, resource rights and forest tenure security

**Efforts to protect forest and biodiversity frequently conflict with local people's land tenure security claims and forest-use practices.** Enclosed protected areas are the most extreme mechanism for restricting local people's access to forests and forest resources in Colombia (Ojeda, 2012; Eichler and Bacca, 2020), Ghana (Bukari and Kuusaana, 2018; Asaaga and Hirons, 2019; Kansanga, Arku and Luginaah, 2019), and Indonesia (Myers and Muhajir, 2015; Astuti and McGregor, 2016; Howson, 2016; Dhiaulhaq and McCarthy, 2019). There are similar issues with REDD+ in Indonesia, where it exacerbates the causes of land-use claims and restricts access to non-timber forest products and subsistence construction materials (Fay and Denduangrudee, 2018; Howson, 2018), particularly affecting indigenous peoples and women's access to forest resources (Larson et al., 2018).

### 7.2.3. Forest governance

There is substantial literature on the effects of government policy and practice on deforestation (see Fischer, Giessen and Günter, 2020, for a recent overview). Recent efforts to address deforestation are increasingly stressing the necessity of governance as a foundation or precondition for effective progress in this area (Arts and Visseren-Hamdkers, 2012). FLEGT initiatives being implemented in countries such as Ghana, Liberia, Indonesia and Cameroon adopt a nationally driven, multi-stakeholder and deliberative approach to reaching consensus on issues of timber legality and legality assurance, and evidence is growing of positive impacts in areas such as legal compliance, transparency and accountability (Overdevest and Zeitlin, 2014; Neupane et al., 2019). Advocates of REDD+ are also increasingly calling for effective and coordinated action to strengthen national and local systems of forest governance if emission reductions are to be effectively achieved (FAO, 2018b). Milgroom and Ribot (2019) caution, however, that changes in access to the physical environment can have profound impacts on customary and traditional authorities. Efforts to reduce deforestation can influence local community members' ability to access forest resources and undermine the role of customary leaders, whose authority is tied to allocating access to forestland. 'Project law', or the ways in which projects are operated and bind their subjects, can have lasting effects on governance structures and institutions (Weilenmann, 2009). Furthermore, the

'projectification' of efforts to achieve sustainable development may fail to align with ongoing governance structures, evoking challenges in governance arrangements (Cerne and Jansson, 2019).

# 8. Measuring the impact of deforestation and biodiversity and their challenges

**Measuring the impacts of efforts to prevent deforestation and biodiversity loss is a complex undertaking** (Rodrigues and Cazalis, 2020). According to the Millennium Ecosystem Assessment, the main drivers of biodiversity loss are habitat change, climate change, invasive species, overexploitation and pollution (WRI, 2005), and the primary drivers of deforestation in the tropics are agricultural and settlement expansion and infrastructure development (Armenteras et al., 2017 in Colombia; Austin et al., 2019 in Indonesia; Amoah and Korle, 2020 in Ghana; see also Daskalova et al., 2020; Jayathilake et al., 2020). These drivers encompass a wide range of activities and actors, often occurring concurrently and affecting people and the environment in tandem in a wide variety of ways.

Stepping and Meijer (2018) identify three primary challenges to measuring the results of efforts to protect biodiversity: first, **biodiversity indicators are seldom comparable across countries;** second, **aid-reporting methods fail to identify projects' biodiversity components;** and third, **the causal links between ODA-funded projects and biodiversity are difficult to identify owing to the wide scope of variables that can effect change.** Seddon et al. (2019) estimate that only 17% of NDCs with ecosystem-based adaptation include robust indicators and targets.

Meijaard et al. (2020) and Duchelle et al. (2018) reviewed claims about the impacts of efforts to halt deforestation and biodiversity loss in Indonesia and found that **only a few assessments included counterfactuals, rendering causal claims questionable.** Meijaard et al. (2020) further show that community forest management projects in Indonesia are notoriously underfunded, limiting their potential impact on deforestation and biodiversity loss, as well as on citizens' livelihoods and well-being (see also Waldron et al., 2018 on the effects of levels of funding on biodiversity loss). In Colombia, the challenges for the implementation and monitoring of the EICDGB are directly related to the complex implementation of the peace agreement, as deforestation is historically linked to the armed conflict. Deforestation is currently concentrated in former conflict zones, where the state has limited presence and capacities for environmental management and monitoring, and where economies have been changing in recent years (2020). Overall, although the EICDBG includes implementation indicators, Colombia is still struggling with implementation itself. The plan for the future is to combine the EICDBG indicators with forest monitoring tools (the impending Forest and Carbon Monitoring System, National System of Forestry Information, and National Forestry Inventory), which would in turn be the base for a monitoring, reporting and verification system (Gobierno de Colombia, 2019).

**An assessment of impact measurement frameworks for natural resource and agriculture projects commissioned by FAO found that the commonest measurement methods were related to forest cover or deforestation rates** (Ross, 2015). The analysis shows that efforts to halt deforestation and biodiversity frequently used data related to forest area, with little evidence of measuring the impacts or challenges to the implementation of these efforts, although more comprehensive indicators were being developed.

**The main challenge in measuring the results of interventions to protect forests and biodiversity is the difficulty of comparing them due to the variety of local contexts.** While efforts to halt deforestation can be measured in terms of forest cover, counterfactuals are difficult to find since biogeophysical, social, economic and political contexts vary. The impacts of halting biodiversity loss are much more opaque than those of halting deforestation, and measuring the extent to which biodiversity loss has been slowed is also a more involved process (Giam, 2017; Ritter et al., 2017 in the Amazon; Durán et al., 2020). Other challenges are related to the complexities behind modelling the indirect drivers of deforestation, and to the limited capacities of states to successfully implement monitoring systems in the first place (Gobierno de Colombia, 2019). The counterfactuals applied in efforts to reduce deforestation and biodiversity loss are also contestable (Giam, 2017; Ritter et al., 2017 in the Amazon; Durán et al., 2020).

# 9. Conclusions

**Our future and the future of the Earth rely on the existence of forests and a harmonious relationship between humans and wildlife.** Humans' economic activities are destroying forests and, with them, the biodiversity that depends on them. The inability of forests and wildlife to regenerate themselves as fast as humans extract them is pushing them towards extinction. Without them, humans will lose products and services needed for their survival. Despite the various concepts and definitions of deforestation and biodiversity loss offered by different groups, humankind needs to come together to address this issue quickly before forests and wildlife completely disappear.

**Continuous pressure to fuel economic growth has brought global deforestation and biodiversity loss to a critical point.** Pristine forests have rapidly declined due to human land-use changes. Natural resource extraction and the expansion of plantations by companies make it difficult or impossible for forests and wildlife to recover.

**Despite some success in reaching international agreements and enacting regional policies, global data from the past three decades shows that there has been little or no change in this trend.** While there have been substantial commitments to fund national action, measures to halt the loss of forests and biodiversity remain underfunded areas within global climate finance. This is due to a wide range of practical challenges that lead to slow implementation of initiatives, together with underlying uncertainties on what approaches are most effective in diverse local and national contexts. However, the Global Environment Facility (GEF) has shown that there is potential to leverage private sector finance into these areas.

**The evidence base on 'what works' in preventing deforestation and biodiversity loss is still at a relatively early stage.** The diversity of approaches and of the national and local contexts in which they are applied make it difficult to extrapolate universally applicable lessons. Furthermore, given the uncertainties in how to measure results, the effectiveness of interventions often depends upon which measures are used. The absence of counterfactuals in the evaluative literature also makes it difficult to be certain of causal claims. Nonetheless, there is emerging evidence of effectiveness in respect of a range of approaches, although in many instances this is accompanied by evidence regarding risks around inadvertent harm if the right preconditions are not in place or if initiatives are designed without due consideration of contextual factors. **Table 9** offers a high-level summary of this evidence.

Table 9: Summary findings on the effectiveness of different intervention types

| Approach | Initiative | Evidence of effectiveness | Risks |
|---|---|---|---|
| Nature-based solutions | Protected areas | Effective when sustained and properly resourced | Vulnerable to changes in government policy<br>Ineffective where there is inadequate staffing and financial resources for enforcement<br>Risk of exclusion of local communities and indigenous people |
| | Reducing emissions from deforestation and forest degradation (REDD+) | Moderately encouraging results on carbon emissions and land-use outcome | Hampered by governance and land tenure conflicts<br>No significant results on improving the well-being of local communities |
| | Payments for environmental services | Successful examples in Costa Rica and Vietnam | Mixed success in the face of underlying challenges such as land tenure insecurity |
| | Land-use planning and moratoria | Some effective examples in Indonesia and Brazil (eg, ban on oil palm | Limited effectiveness in the face of complex changes in land-use patterns |

| | | | |
|---|---|---|---|
| | | plantations and soy in natural forests) | |
| | Community-based natural resource management | Good evidence that devolving management to local communities leads to better conservation outcomes, while strengthening local livelihoods | Hampered by unclear land tenure<br>Low returns in terms of reduced emissions<br>Risks of elite capture of benefits |
| | Jurisdictional approaches | Early evidence of effectiveness in reducing deforestation and strengthening citizen engagement | Limited track record as yet<br>Encompass diverse range of interventions, making it difficult to identify success factors |
| | Sustainable agricultural intensification | At best, short-term effects on deforestation | Potential perverse impacts on land-use conversion by increasing rents<br>Benefits go to wealthier farmers with secure tenure |
| **Voluntary commitments by the private sector** | Product-specific standards | Weak and mixed evidence of effectiveness regarding forest loss<br>Only effective for companies trading in markets with strong consumer demand for sustainability<br>Most effective when done in collaboration with government and involving governance reforms | Strong public commitments often not accompanied by equally strong evidence of implementation |
| **Regulation of markets** | EU Forest Law Enforcement, Governance and Trade (FLEGT) | Evidence of reduced illegal logging, but illegal logging unlikely to be the primary driver of deforestation<br>Improved local governance in forest areas | Emerging markets (such as China) are increasingly important actors, but have less stringent timber import requirements which reduces the overall trade leverage |
| | International agreements on trade in endangered species | Main convention (CITES) has reduced illegal trade | Dominated by state actors in global North |
| **Sustainable finance** | 'Financing green' (inclusion of ESG safeguards) | Seeks to engage with huge volumes of capital funding unsustainable land use across the tropics<br>Effective in influencing international financial markets | Forest risk commodities (soya, beef, rubber, timber) often financed outside international markets so national efforts are required in producer countries to be effective |

Source: authors' analysis, based on summary evidence from chapters 1 to 8

**Some cases of good practice in the attempt to halt deforestation and biodiversity loss are overshadowed by difficulties with ensuring their equity and inclusivity.** A number of relatively small programmes have succeeded on this front, however. Community forest management and land use moratoria have the potential to slow

deforestation and biodiversity loss. However, these approaches are exclusive where indigenous peoples and local communities are denied a voice in the decision-making even though it is they who are directly and most severely affected by forest and biodiversity loss. Most efforts to halt deforestation and prevent biodiversity loss are effective when they meaningfully consider local and indigenous communities' voices in the design, ensure gender balance and are adapted to local context.

**The impact of deforestation and biodiversity loss on populations, especially indigenous peoples and local communities, is immense.** It affects livelihoods, cultural activities, mental health and spiritual well-being. Measuring the impacts of these losses is complex, as some of the resources that are destroyed, such as ancestral sites, are unquantifiable. The close monitoring and evaluation of progress toward halting deforestation and preventing irreversible biodiversity loss is the key to spurring urgent action to halt the spoliation of the Earth before it is too late.

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