

Goal 4 Assessment

Technical Annex to the Five-Year Assessment Report

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Goal 4

Support alternatives to deforestation driven by basic needs (such as subsistence farming and reliance on fuel wood for energy) in ways that alleviate poverty and promote sustainable and equitable development

Key messages

- Measuring progress towards Goal 4 remains difficult due to a lack of data on the forest impacts of interventions that promote alternative basic-needs activities. Most poverty and sustainable development interventions do not track forest impacts, making it difficult to determine how much support is specifically addressing forest loss.
- Basic-needs activities are not always harmful to forests, but under certain contexts and socio-economic conditions, they may lead to forest loss. Wood harvesting and small-scale crop production are the two most common basic-needs activities that may have a negative impact on forests.
- Activities conducted for basic needs – such as woodfuel collection – often lead to forest degradation, rather than deforestation, which makes impacts more difficult to observe and measure. These impacts may also be balanced by regrowth, but this too may not yet be tracked or measurable.
- A lack of livelihood alternatives and increased population pressures often trigger unsustainable forest use to meet basic needs. Socioeconomic pressures can lead to an expansion in agricultural land, which is the most significant cause of basic-needs deforestation. Insecure tenure rights can exacerbate these pressures, as communities are unable to invest in efforts to maintain land quality.
- Efforts to address deforestation driven by basic needs often focus on formalization, through measures like licensing, regulation, and clarification of land use rights. Though often well-intentioned, formalization may lead to negative outcomes if implemented poorly. The formalization of basic-needs activities must include social safeguards and livelihood considerations, supported by good governance frameworks, to reduce forest impacts while protecting livelihoods and community well-being.
- The clean cooking sector is embracing alternative business models and non-biomass fuel options to increase uptake and usage of clean cooking technology, which can reduce fuel use by 30-60 percent and relieve pressure on forests.

Overview of goal and indicators

As of 2019, nearly 20 percent of the world's population depends on forests and forest products to provide some or all of their livelihoods,¹ including materials for housing, fuel, medicine, food, and income. Forests also serve as places of cultural importance for many local populations. A subset of these forest-dependent communities engage in activities that may contribute to forest loss and degradation. Goal 4 aims to support alternatives to these activities to reduce forest loss while addressing underlying issues of poverty and equity through sustainable development.

Defining the basic-needs activities that drive deforestation and forest degradation

Basic-needs activities serve to sustain subsistence (e.g. food, shelter, cooking fuel, water). In addition to activities that directly provide for subsistence needs, for the purposes of the Goal 4 assessment, we consider smallholder commercial activities such as market farming, artisanal and small-scale mining, and charcoal production to be basic-needs activities because they often provide subsistence-level incomes for practitioners and their families. These activities are not always harmful to forests, but under specific circumstances or depending on the context and socioeconomic conditions, may lead to forest loss (forest degradation and/or deforestation). The dividing line between basic-needs activities and other commercial activities – such as agricultural commodity production covered under Goal 2, and large-scale mining covered under Goal 3 – is usually a question of scale, and an individual's or community's shift from subsistence production to commercial production may be difficult to measure.² Therefore, in the same landscape, it is often challenging to disaggregate forest impacts from these activities.

Several types of basic-needs activities can be associated with deforestation and forest degradation (**Box 1**). A literature review performed by the International Center for Tropical Agriculture (CIAT) found that the most common activities performed by basic-needs populations that are associated with deforestation and forest degradation are wood harvesting and small-scale agriculture.³ There are also regional differences in the type and impact of specific basic-needs activities. In Africa, 93 percent of tree cover loss is due to shifting agriculture, compared to 24 percent in Latin America.⁴ South Asia and East Africa are currently 'hotspots' for deforestation and forest degradation driven by woodfuel collection, with over 50 percent of harvests being nonrenewable.⁵

Some basic-needs activities in this analysis may also be characterized as informal or illegal activities. Informal practices occur outside of regulated market structures, but they may be legal under customary arrangements or local law.⁶ Illegal mining or illegal crop production, on the other hand, by definition, operate outside of the law. Supporting alternatives to these basic-needs activities requires different approaches depending on the activity's legal status.

Box 1. Basic-needs activities associated with forest impacts

- **Swidden or 'shifting' agriculture:** Traditional practices that clear forest land for short-term crop production before moving on and allowing forests to regenerate. Swidden agriculture's effect on forests depends on the time fallow areas are given for regeneration and the type of clearing techniques used.
- **(Permanent) subsistence agriculture:** Subsistence-level crop production in or near forests, where crops are continuously grown on the same parcel of land. This type of farming has mixed impacts on forest quality. The primary mechanism for forest loss is through cropland expansion, usually due to population pressures, which leads to additional forest clearance.
- **Wood harvest / woodfuel collection:** Those activities that include the small-scale and non-mechanized extraction of wood biomass from forests. Woodfuel collection for firewood or for charcoal production is primarily a driver of forest degradation rather than deforestation. Wood harvest can also be part of the cultivation-fallow cycle for swidden agriculture.
- **Artisanal and small-scale mining:** The unlicensed extraction of mineral resources by independent miners or small enterprises. Individuals may conduct this type of mining to provide some or all of their basic incomes, possibly through contracts with larger companies; or the mining may be mechanized and organized by small businesses.
- **Non-timber forest products:** The collection of forest products other than wood or timber (e.g., medicinal plants, bush meat, nuts, and fruits). The collection of non-timber forest products may lead to forest degradation through the direct removal of biomass (e.g. plants) or through the disruption of natural regeneration processes (e.g. removing fruits before seeds can be dispersed).
- **Livestock raising:** Livestock activities such as cattle raising and livestock grazing. Farmers who do not own land or manage pastures may allow their animals to range and forage into forests or other available areas.⁷ The literature indicates that forest impacts of livestock raising are limited compared to other basic-needs activities.

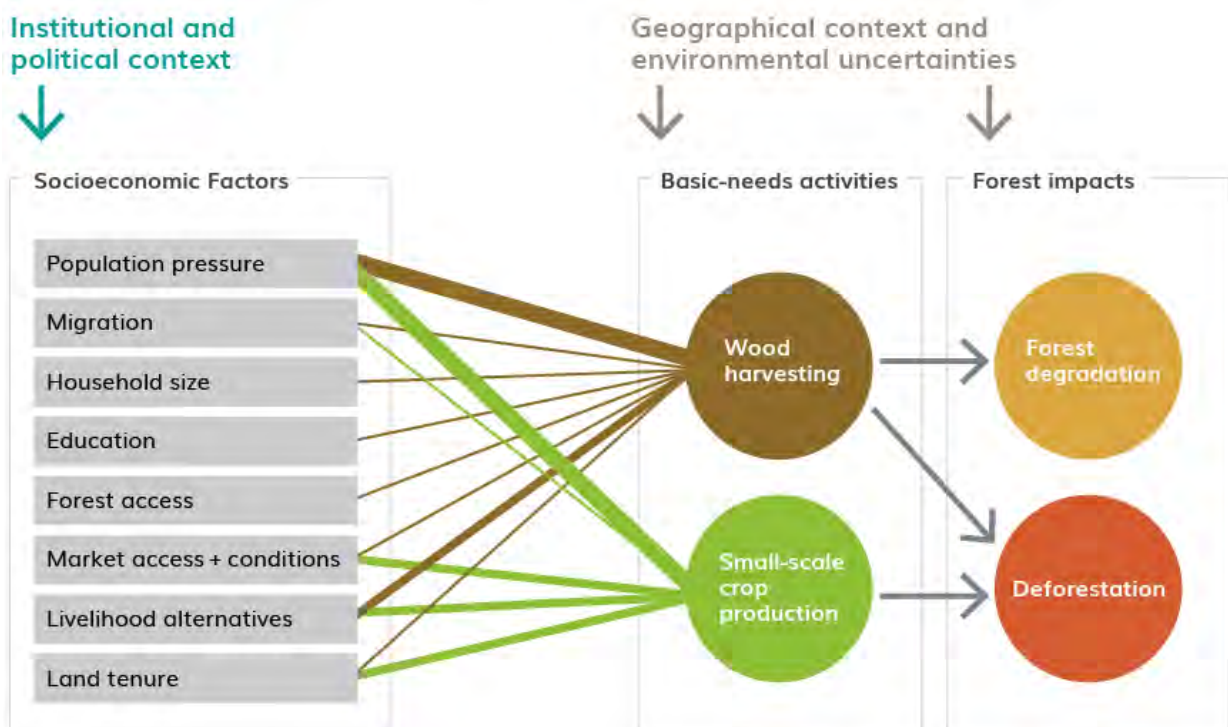
- **Illegal crop cultivation:** The cultivation of illicit crops such as coca or papave. Overall this activity has been demonstrated to be a less significant driver of forest loss than other basic-needs activities.

Poverty, inequality, and migration act as indirect drivers of basic needs-driven deforestation and forest degradation

Existing structures of poverty and inequality tend to exacerbate basic needs-driven deforestation and forest degradation. In turn, deforestation can contribute to the persistence of these structures. Efforts to reduce forest impacts from basic-needs activities must contend with these complex socioeconomic factors.⁸ **Figure 1** illustrates the relationship between socioeconomic factors and the two most prevalent basic-needs activities that drive forest loss, wood harvesting and small-scale crop production. A lack of livelihood alternatives and increased population further increase pressure on forests. In addition, the sustainability of crop production can be affected by land tenure status as well as the market conditions to which the farmer has access. Understanding the local dynamics of these indirect drivers is a critical step toward achieving Goal 4.⁹

Figure 1.

The socioeconomic context of basic needs-driven deforestation and forest degradation



Note: The thickness of the connecting lines between socioeconomic characteristics and basic-needs activities indicates the reported strength of the causal relationship, according to quantitative and qualitative data from researchers in the reviewed literature.

Source: Adapted from Francesconi, W., Vanegas, M., & Bax, V. (2019). Unraveling the socioeconomic context of basic needs deforestation and forest degradation: a systematic review. Cali, Colombia: International Center for Tropical Agriculture (CIAT) (unpublished report produced for the New York Declaration on Forests Progress Assessment.)

Lack of economic opportunity harms forests

A lack of non-forest livelihood alternatives for forest-dependent communities^a is a key factor leading to basic needs-driven forest loss.^{10,11} A survey of such communities in Ghana found that 27 percent of people blamed a lack of other economic opportunities for their need to engage in deforestation and degradation activities – including wood logging, charcoal production, and hunting.¹² Where the economy excludes poor populations from the chance for growth, forests can suffer. The highest rates of deforestation in Latin America occur in areas with the largest disparities in wealth, income, and land ownership.¹³ High levels of inequality can undermine the institutions and incentives that enable sustainable livelihood activities, including reduced access to land and the prevention of collective action.¹⁴ At the same time, high inequality can enable increased deforestation from large-scale, commercial agriculture (see [Goal 2](#)).

Demographic changes, including migration, increase pressure on land and resources

As local populations increase, they may clear forests for agricultural expansion, shelter construction, and infrastructure development.¹⁵ For example, in the Congo Basin region, small-scale forest clearing for agriculture accounts for 84 percent of forest-loss area, correlating closely with population growth rates in the region.¹⁶ Additionally, a recent study in Malawi found that a 1 percent increase in population growth increased deforestation by 2.7 percent, primarily through increases in agricultural land.¹⁷ These demographic pressures often drive agricultural intensification, lowering agricultural productivity and incentivizing farmers to convert more forest to cropland or engage in other forest-based activities.¹⁸ Fast-growing rural populations as well as conflicts can produce a large number of ‘frontier migrants,’ who move into previously unsettled landscapes to seek opportunity, often in protected areas.¹⁹ Further, in many basic-needs communities in Latin America, the forest frontier continues to come with the promise of land and eventual land title, resulting in a persistent settler mentality.^{20,21}

Population growth can also correlate with increased local demand for forest products and access to markets.²² The resulting commercialization of pre-existing basic-needs activities raises the profitability of deforestation and forest degradation.

The scale and impact of key basic-needs activities

In the following section we focus on three categories of basic-needs activities that have the highest impact on forests: agriculture, woodfuel harvest, and small-scale mining.

Swidden and subsistence agriculture continues to pose a threat to forests in tropical regions

An analysis of high-resolution maps indicates that 21 percent of global tree cover loss from 2001-15 was due to shifting agriculture.²³ In the Democratic Republic of the Congo (DRC) and the Central African Republic, small-scale clearing for shifting agriculture accounts for over 90 percent of tree cover loss.²⁴ However, much of this loss is not permanent as cycles of shifting agriculture allow trees to regrow. Meanwhile, 15 percent of Indonesian deforestation from 2001-16 – a loss of 1.4 million hectares – was due to small-scale agriculture.²⁵ Small, mixed plantations added another 660 thousand hectares (7 percent) to this total. The primary threat to forests from small-scale agriculture comes from cropland expansion, whereas shifting agricultural systems may allow forests to regrow as part of rotational cycles.

Woodfuel collection dynamics are variable

As of 2017, 2.4 billion people rely on firewood and charcoal for cooking, and an estimated 30 percent of global woodfuel harvests are unsustainable.²⁶ Forest degradation from woodfuel collection can be

^a In the context of this report, “forest-dependent” communities are those which live in highly forested areas and derive some or all of their livelihoods from forests. This definition builds from a paper by Newton et al. published in *Land Use Policy*.

severe in areas with rapidly growing populations (e.g., as a result of population displacement²⁷) and environmental changes (e.g., droughts and desertification). In some cases, charcoal production can facilitate deforestation due to its profitability lowering or offsetting the cost of land clearance for agriculture or other purposes. However, since charcoal production is a significant source of rural livelihoods in some regions, people may respond to scarcity and shift the location of production, allowing forests to recover over time. In Haiti, for example, charcoal-supplying regions have shifted in response to decentralization and transportation changes, allowing for forest recovery in historical production areas.²⁸

Artisanal and small-scale mining supports livelihoods, at a cost

Growing investment in artisanal and small-scale mining, particularly in Central and South America, drives deforestation and forest degradation in highly localized contexts. This type of mining consists of individuals engaging in mining to earn a livelihood as well as small-scale commercial mining businesses. It is estimated that over 150 million men, women, and children engage in or are dependent on artisanal mining.²⁹ Currently, 70-80 percent of small-scale miners operate in an informal context (roughly 40.5 million in 2017, up from 30 million in 2014), meaning they lack the necessary licenses and permits to operate. This informality makes it difficult for governments to regulate their mining activity.³⁰ While the percentage of global forest loss from small-scale mining remains relatively low, the rate of mining-driven deforestation is increasing in areas like the Peruvian Amazon (**Box 2**). In addition to the forestland cleared for the mines themselves, mining activities further contribute to forest loss through exploration activities, the development of roads and other infrastructure intended to service mining activity ([Goal 3](#)), and impacts on local diets in response to ecosystem destruction and pollution.³¹

Box 2. Case Study: The impacts of artisanal and small-scale gold mining in the Peruvian Amazon

Between 1984 and 2017, artisanal and small-scale gold mining caused nearly 100,000 hectares of deforestation in the Peruvian Amazon, 53 percent of which occurred since 2011 and 10 percent of which occurred in 2017.³² Small-scale mineral mining (excluding fossil fuels) continues to expand in the region, having grown to 65 percent of all new mining in 2017. While the increasing rates of deforestation from mining initially paralleled increases in the price of gold, deforestation in the Peruvian Amazon has continued to rise despite gold prices dropping from 2012 to 2017. Previous attempts by the national government to reign in mining-driven deforestation in the region have been largely unsuccessful. During a period of increased enforcement by the Peruvian National Police between 2009 and 2017, mining-driven deforestation rose by more than 240 percent.³³ In February 2019, the Peruvian government again launched a coordinated campaign to crack down on illegal mining in the department of Madre de Dios, committing 1,500 police and military officers to the region and declaring a state of emergency.³⁴ Halting or reversing the trend of conversion to artisanal mining in Peru will likely require sustained, large-scale interventions that target the underlying drivers, including land tenure rights and smallholders' livelihood needs.

Reducing deforestation and forest degradation driven by basic needs

Targeted support for alternatives to basic-needs activities that drive deforestation and forest degradation encompass a wide range of interventions. Examples of such measures for woodfuel collection and wood harvest include the development and scaling up of clean cooking solutions, the establishment of energy plantations specifically for fuelwood, and the implementation of community forest management. For subsistence and shifting agriculture, sustainable intensification interventions can encourage land-sparing. Other interventions may include securing land tenure for indigenous peoples and local communities (see [Goal 10](#)) and incorporating informal livelihood activities into the formal economy, though the latter has had mixed outcomes.

Assessing progress

It remains difficult to present aggregated data on the effect of Goal 4-related initiatives on forest cover and quality due to a lack of in-depth research in this area and methodological challenges.^{35,36}

In previous years, the Goal 4 assessment presented data on the distribution and financial support for clean cookstoves as an alternative to unsustainable woodfuel collection. This year, due to data collection revisions (see **Data developments**, below), we are unable to present updated data according to those indicators. Instead, we continue to present case studies and descriptions of initiatives to address basic needs-driven forest impacts through alternative strategies. As in previous years, we consider smallholder activities that contribute to livelihoods for forest communities under our Goal 4 analysis, distinguishing them from activities undertaken by large company actors considered under Goals 2 and 3. A revised assessment framework for Goal 4 will be created for our 2020 update.^b

Findings

Tackling informality to reduce forest loss requires multi-pronged interventions

The formalization of informal activities is one of the most common strategies to reduce forest pressures from basic-needs activities.^{37,38} The underlying assumptions of formalization as an environmental protection measure are that governments will be able to more effectively regulate formal activities in forest areas, and that forest producers will be more likely to comply with environmental regulations when they have secure property rights.³⁹ Formalization can include the licensing and regulation of production and trade of forest products to encourage the adoption of certain practices and technologies, while capturing tax revenue for the state.^{40,41} It can also involve the clarification of land tenure, which alongside forest monitoring and effective enforcement, can lead to reduced forest loss.⁴² When forest communities have secure rights over their land, they are more likely to conserve and sustainably utilize that land,⁴³ resulting in higher carbon stocks,⁴⁴ better forest and biodiversity conservation,⁴⁵ and improved social and economic outcomes.⁴⁶

However, secure property rights can also lead to the expansion of economic activity on the land, which may result in more forest clearance.⁴⁷ It can also transform informal producers, who merely operate outside of mainstream economic pathways, into illegal operators, subjecting them to fines, displacement, or imprisonment.⁴⁸ Therefore it is important that formalization interventions are designed with social safeguards in mind, applying the rules of good governance. **Box 3** illustrates a case where secure community land rights, in combination with certification of timber production, have led to positive forest and livelihood outcomes.

Box 3. Case study: Community forestry leads to forest gain in Guatemala's Maya Biosphere Reserve

Community forest management has proven to be effective at decreasing forest loss while maintaining livelihoods in Guatemala's Maya Biosphere Reserve (MBR). Located within the Selva Maya forest, the largest broadleaf tropical forest in Mesoamerica, the MBR is managed by the National Council of Protective Areas (CONAP). Nine communities have been granted concessions to manage forest area, and they are required to achieve and maintain Forest Stewardship Council certification within three years of being granted use rights, the costs of which are covered by donor support. The Asociación de Comunidades Forestales de Petén, the umbrella organization of the communities managing the concessions, has created an organization specifically to support member communities to maintain and refine their forest businesses. According to the Sixth Monitoring Report on Governance in the MBR, published by USAID, CONAP, and the Wildlife Conservation Society, the MBR experienced a net forest gain of 1,088 hectares, 34 percent of which occurred in five community forest concessions.⁴⁹ These concessions have created nearly 7,000 jobs, generated timber sales of nearly USD 50 million, and kept deforestation rates near zero.⁵⁰

^b In 2020, the NYDF Assessment Partners will focus on Goal 4 as part of our annual in-depth assessment. Together with an expert working group, we will revise the assessment framework to allow for a deeper tracking of progress in line with previous in-depth assessments. In this 2019 update, we present provisional criteria and indicators, which will be considered and revised with the working group on Goals 3 and 4 over the next year. If you are a researcher or member of an organization working on the forest impacts of basic-needs and livelihood activities, and are interested in contributing to the 2020 in-depth assessment of Goal 4, please write to us through our Contact Page.

Formalization of artisanal and small-scale mining requires good governance

Over 70 percent of small-scale miners operate in the informal sector,⁵¹ leading many governments and international organizations to push for formalization of the sector, often with the involvement of large-scale mining companies. Each of the World Bank's 35 mining sector reform projects exceeding USD 1 million includes funding for small-scale formalization.⁵² Certification, through ethical mineral certification schemes, provides another route toward formalizing and improving artisanal mining practices. In 2014, there were at least 11 certification schemes for responsible and/or sustainable artisanal mining, up from 7 in 2010. Most of these schemes target Latin America.⁵³

Formalization of artisanal and small-scale mining faces significant barriers in its implementation. A shortage of reliable data on the scale and practices of small-scale miners has proven to be a significant barrier to formalization in many countries.⁵⁴ In Guyana, attempts to formalize small-scale mining have been undermined by narrow interventions that target tenure security without providing additional state support and technical capacity building.⁵⁵

While formalization may provide labor security for miners operating at a basic-needs level, governments often restrict formalized mining to limit deforestation and other environmental degradation.⁵⁶ These restrictions may exclude small-scale miners from this livelihood activity altogether. Formalization has been shown to be most effective at improving miner safety and livelihood outcomes while reducing negative environmental impacts when initiatives include supplementary interventions, such as developing targeted legal frameworks; improving miner access to geological data, capital, and equipment; providing capacity building; and enabling dialogue between stakeholders.⁵⁷

The charcoal sector demonstrates the varied impacts of formalization

Between 1964 and 2014, global charcoal production grew from 17.3 million tons to 53.1 million tons; meanwhile, deforestation drives down the availability of forest biomass.⁵⁸ Sustainable production of charcoal is possible if supportive policies (e.g., protected harvest areas) are in place.⁵⁹ However, the application of such policies depends upon sector formalization. In Tanzania – where charcoal and fuel wood constitute up to 90 percent of energy supply – factors like secure tenure, formalized production management, and strategic harvesting plans were found to reduce degradation.⁶⁰ In contrast, the absence of formalized charcoal production and the exclusion of sustainable charcoal from national policies contributed to greater forest degradation and deforestation, especially in concentrated markets.⁶¹

The clean cooking sector adopts new approaches to reduce woodfuel reliance

The clean cooking sector has long sought to reduce forest loss and degradation from woodfuel collection. Over the past few years, significant steps have been taken to reduce the impact of cookstoves on deforestation and forest degradation. Modern cookstoves are more efficient than traditional stoves, reducing fuel use by 30-60 percent and resulting in decreased pressure on forest resources.⁶² New business models are emerging to improve access and usage of clean cooking products, including pay-as-you-go^c models and the integration of fuel sales.⁶³ Furthermore, the sector is embracing alternative fuels such as liquified petroleum gas (LPG).⁶⁴

Some national governments have recently adopted policies – such as reduced taxes and tariffs – that support the growth of the clean cooking business. The Kenyan Government, for example, removed excise duties on denatured ethanol and the 16 percent value-added tax on LPG to improve affordability and encourage investment in the use of ethanol and LPG for cooking.⁶⁵

Financing for clean cooking stoves increased by 36 percent from 2016 to a total of USD 40 million in 2017, though it remains only 1 percent of the 4 billion USD needed to enable universal access by

^c Pay-as-you-go models enable low-income consumers to purchase clean fuel as needed in small, more affordable quantities.

2030.⁶⁶ This investment also remains concentrated in East Africa, with over 50 percent to companies headquartered in the region.⁶⁷ While the number of cookstoves and fuels distributed in developing countries nearly doubled between 2015 and 2016, the rates of usage are not growing as fast. One study found that due to maintenance and practicality issues, the usage of clean cook stoves in Malawi fell to 50 percent in 2017.⁶⁸ However, when adopted, clean cookstoves can be effective at protecting forests. Recent research from India demonstrated that transitioning to clean fuels, such as biogas, promoted forest regrowth.⁶⁹

Budget allocations for basic-needs alternatives through REDD+ show some promise, but most funding remains to be distributed

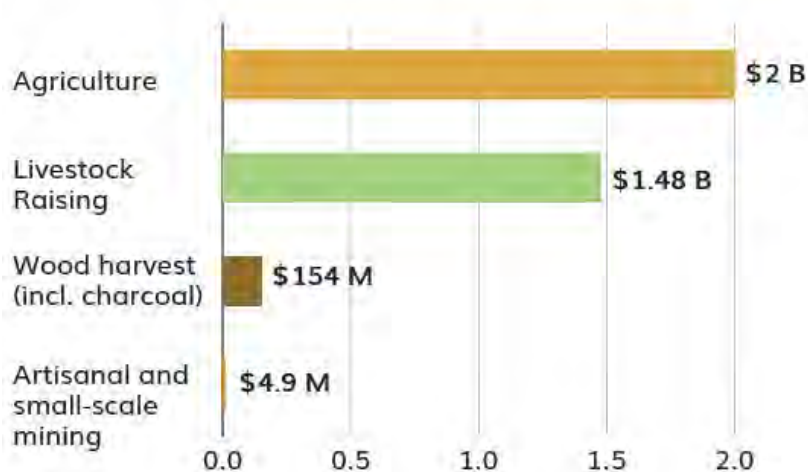
The concept of reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries (REDD+) was introduced in the international climate negotiations as a mechanism for national governments to address forest loss. In practice, while governments and multilateral organizations have engaged in long planning and preparatory processes, implementation thus far has consisted largely of subnational pilot projects, which often focus on addressing forest loss from basic-needs activities engaged in by local forest populations.⁷⁰

From the limited available evidence, local REDD+ projects have demonstrated mixed success in improving the well-being of project-affected communities.^{71,72} Projects which include incentives for forest protection (e.g. payments for ecosystem services) alongside disincentives (e.g. enforcement of land use restrictions) are more likely to achieve both forest and sustainable development goals.⁷³

At the same time, a number of developing countries have allocated funding under the Forest Carbon Partnership Facility's REDD+ programs to support livelihood alternatives to basic needs-driven forest loss. According to the Emission Reduction Program Documents (ERPDs) of 16 countries, committed funding related to basic-needs activities totals roughly USD 3.5 billion. For example, in the ERPD for the DRC, budget allocations are made to basic-needs relevant activities, such as assisted natural regeneration for charcoal production, family planning, and formalization and strengthening of the fuelwood sector.⁷⁴ **Figure 2** illustrates the budget allocations outlined in country ERPDs for interventions that may address deforestation driven by basic-needs activities. By far, the most funding is budgeted for agricultural activities (USD 540,000 in DRC) and charcoal production (USD 1,900,000 in DRC), while both aquaculture and illegal crop production activities receive little to no funding. Notably, these budgeted funds have yet to be distributed as these programs have not yet gone into effect.

Figure 2.

Budget allocations that may support basic-needs alternatives under Forest Carbon Partnership Facility REDD+ programs



Note: Figures are cumulative from the Emission Reduction Program Documents of 16 countries. Because budget lines may be applicable to multiple basic-needs activities, summed totals are not exclusive, e.g. the Livestock raising total may include budget lines that also target agriculture or wood harvest. However, each budget line has only been counted once. Note that budgeted funding under the Forest Carbon Partnership Facility's readiness programs have yet to be distributed.

Source: Climate Focus analysis based on data from Emissions Reductions Program Documents for 16 countries whose budgets are broken down by activity (Chile, Cote d'Ivoire, Democratic Republic of the Congo, Dominican Republic, Fiji, Ghana, Indonesia, Lao People's Democratic Republic, Madagascar, Mexico, Mozambique, Nepal, Nicaragua, Peru, Republic of Congo, and Vietnam). Activity descriptions were drawn from the "Description of Actions and Interventions to be Implemented Under the Proposed ER Program" sections, and budget allocation information from the "Operational and Financial Planning – ER Program Budget" sections of the ERPDs. Activities and sub-activities were chosen for inclusion when there was a reasonable connection to basic-needs activities included in this Goal 4 analysis, e.g. support for climate-smart agriculture, rationalization of artisanal gold mining, and improving charcoal stocks.

Data developments

Imaflora to examine impacts of smallholder cattle ranchers in the Brazilian Amazon

Of the 1.7 million cattle ranchers in Brazil, only an estimated 18 percent run profitable production systems.⁷⁵ Profitable ranchers are those able to adopt new practices and technologies, access specialized labor and credit lines, and explore new market opportunities. Lacking the resources to improve their production systems, the other 1.4 million cattle producers operate under conditions that lead to land degradation. Pasture degradation represents an estimated 20 percent of farm operational costs, corroding profitability and forcing ranchers to sell property or stimulating them to open new pasture lands through deforestation. Over the last decades, a number of development projects have been implemented in smallholder farms in the Brazilian Amazon that propose production alternatives to avoid deforestation. These projects are focused on building farmers' capacity to transition to intensified and diversified production systems (e.g. silvopastoral and cocoa plantations).

To contribute to the assessment of Goal 4), Imaflora (Instituto de Manejo e Certificação Florestal e Agrícola) will evaluate the socioeconomic context of smallholder livestock production in the Brazilian Amazon and identify production alternatives that may expand vulnerable producers' livelihood options while avoiding further deforestation. The research project will include geospatial analysis of smallholder farms along the Amazon-agricultural frontier in Mato Grosso and Pará, Brazil, along with field interviews with farmers, farmer unions and co-operatives, project developers, and agribusinesses. The project aims to evaluate the effectiveness of production alternatives that have already been tested in the region, while evaluating related national climate and agriculture policies. Besides contributing to the design of the Goal 4 assessment framework in 2020, results of this research are expected to inform improvements in the implementation of public policies and development projects towards sustainable agriculture and forest conservation in smallholder systems in the Brazilian Amazon.

Changes in measurement and data collection for improved biomass/clean cooking interventions

The Clean Cooking Alliance is currently developing a comprehensive monitoring and evaluation framework to more robustly track progress of its own work and work done by other actors in the clean cooking sector. In the past, the Alliance has tracked the number of stoves distributed, which did not provide a comprehensive picture of progress. Given recent advances in technology, business models, sector financing, and policies, a broader range of indicators are needed to assess these changes. These indicators will be sorted amongst three levels of action, from project-level outcomes, to actions taken in accordance with the Alliance's own strategy, to sector-level actions from other stakeholders and interventions. The final framework will be defined over the next year in close collaboration with partners.

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