

# Public-Sector Measures to Conserve and Restore Forests:

## Overcoming Economic and Political Economy Barriers

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## About the authors

**Rohini Chaturvedi** is an independent sustainable development consultant and a former WRI senior associate.

Contact: [rohini.chaturvedi@cantab.net](mailto:rohini.chaturvedi@cantab.net)

**Craig Hanson** is vice president of Food, Forests, Water and the Ocean at the World Resources Institute.

Contact: [chanson@wri.org](mailto:chanson@wri.org)

**Helen Ding** is an economist with the Economics Center at the World Resources Institute.

Contact: [helen.ding@wri.org](mailto:helen.ding@wri.org)

**Frances Seymour** is a distinguished senior fellow at the World Resources Institute.

Contact: [frances.seymour@wri.org](mailto:frances.seymour@wri.org)

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# Executive Summary

## HIGHLIGHTS

- Forests are a critical form of natural capital that supports economic development and improved human well-being. In particular, forests provide a range of goods and services that generate income, food, energy, improved health, safety, and global public goods.
- A number of public-sector measures have proved effective (or show promise to be effective) at forest conservation and/or restoration: Avoid public land handouts, place moratoria on forest conversion, establish protected areas, secure tenure and protect indigenous territories, build climate-smart roads, enforce the law, develop conversion-free supply chains, improve transparency, sustainably intensify agricultural production, decrease agricultural commodity demand, increase relative financial attractiveness of trees versus no trees, and strengthen decentralized resource management.
- These measures have not sufficiently worked at scale yet because of a number of economic and political economy barriers: Forests too often are allocated for political gain, forests conversion equates to economic gain, forest conservation and restoration can be hard to finance, forest tenure is too often unclear or nonexistent, political management of forests is too often unaligned, and illegality or corruption is left unchecked.
- Accelerating and scaling public-sector support for forest conservation and restoration will require that these economic and political economy barriers be overcome. This working paper suggests a number of strategies and tactics for addressing each of these barriers.

## CONTEXT

**The world's forests span nearly 4 billion hectares** (FAO 2015). Forests provide a range of benefits, with approximately 1.6 billion rural people depending on them to some extent (Chao 2012). Billions more depend on forests for income and for global public goods such as rainfall and a stable climate.

**Despite these benefits, the world's forests continue to suffer from deforestation and degradation.** Between 2001 and 2015, the world experienced about 314 million hectares (Mha) of tree cover loss.

**Deforestation and degradation have big climate impacts.** Land use change, the majority of which is deforestation, and forest degradation currently account for about 11 percent of total net human-made global greenhouse gas emissions (UNEP 2013). Gross emission levels for forest conversion and degradation are even higher.

**Curtailing this deforestation and degradation and restoring some of the world's lost forests is critical to achieving the Sustainable Development Goals and the Paris Agreement on climate change.** The question is how to do this.

## ABOUT THIS WORKING PAPER

- This working paper explores four questions requested by the Food and Land Use Coalition (FOLU):
- Why are forests critical to economic development and human well-being?
- What public-sector measures could conserve and restore forests?
- Why haven't these public measures sufficiently worked at scale yet?
- How can one overcome the economic and political economy barriers to these measures?

The paper serves as a contribution to the FOLU report, *Growing Better: Ten Critical Transitions to Transform Food and Land Use* (2019). The responses to these questions are heavily based on the responses in the publication *Why Forests? Why Now?* (2016) by Frances Seymour, a coauthor of this working paper, and Jonah Busch, a peer reviewer of this working paper. We start with those responses and then build on them with findings from additional (and in some cases more recent) published reports, as well as with perspectives from the coauthors. Their perspectives were developed from their own research (e.g., literature review), their own previous writings (e.g., *The Restoration Diagnostic* by Hanson et al. (2015)), and insights from their work on forest conservation and restoration issues and projects.

## KEY FINDINGS

**Forests are a critical form of natural capital that supports economic development and improved human well-being.** In particular, forests provide a range of goods and services that generate income, food, energy, improved health, safety, and global public goods.

- *Income and livelihoods.* Forests provide income to people through the direct use or sale of goods and services coming from forests (e.g., timber, nontimber forest products, tourism).
- *Food.* Forests provide a range of goods and services that directly and indirectly increase food supply for people. In terms of goods, forests are a source of wild game, fruit, nuts, and fungi. In terms of services, forests can help boost agricultural yields by preventing soil erosion, moderating water flows so more water is available downstream during the dry season, and serving as the home of pollinators like insects and bats.
- *Energy.* Forests are a source of energy. Wood contributes 6 percent of total primary energy supply globally and as much as one-third in developing countries (FAO 2018). More indirectly, forests provide energy by securing water supplies for hydro power generation.
- *Health.* Forests contribute to human health in a number of ways, including by providing clean drinking water, medicines, and clean air. Forests also can help prevent the spread of some infectious diseases.
- *Safety.* Some forests can reduce the impact of natural hazards (e.g., landslides, avalanches, floods, storm surges) and thereby improve human safety.
- *Global public goods.* Forests are the ecosystem that supports the most biodiversity on the planet. Forests capture atmospheric carbon dioxide and store it as carbon in vegetation and soils. Forests also play a role in generating rainfall for downwind agricultural areas.

**In light of the economic, social, and environmental value of forests, what can governments do to conserve and restore forests? History indicates that a number of public-sector measures have proved effective (or show promise to be effective) at forest conservation and/or restoration.** The first category of measures reduces the amount of forested land that is available for deforestation. In essence, each of the following measures in its own way “shrinks” the supply of land for conversion:

1. Do not make public land available for conversion.
2. Place moratoria on forest conversion (to agriculture).
3. Establish protected natural areas.
4. Secure tenure and protect indigenous territories.
5. Plan “climate-smart” road networks.

The second category of measures makes it “expensive” (politically, economically, legally, reputationally) to convert forests into agricultural land or other use:

6. Enforce the law.
7. Implement conversion-free supply chain contracts.
8. Increase transparency of land-use and land-cover change.

The third category of measures reduces the (economic) pressure or incentive for an alternative use of forested land (primarily agriculture) and/or reduces the pressures that keep trees from recovering on land that was once forest:

9. Pursue sustainable intensification of agriculture.
10. Reduce demand for agricultural commodities.
11. Change the relative financial attractiveness of trees versus no trees.
12. Strengthen decentralized, participatory forest management.

**If forests provide so many benefits and if multiple measures have proved to be somewhat effective at conserving and restoring forests, why haven’t these measures sufficiently worked at scale yet? The short answer is that there are at least six economic and political economy barriers:**

- Forests too often are allocated for political gain (“patronage and power”).
- Forests conversion equates to economic gain (“worth more dead than alive”).
- Forest conservation and restoration can be hard to finance (“where’s the money?”).
- Forest tenure is too often unclear or nonexistent (“who’s the owner?”).
- Political management of forests is too often unaligned (“working at cross purposes”).
- Illegality/corruption is left unchecked (“laws on the books but not in practice”).

**We suggest a number of strategies or tactics for addressing each of these barriers.** Overcoming “patronage and power” entails developing political pressure that dissuades public-sector leaders from handing away forests (or undermining efforts to conserve/restore forests) as a means of garnering and maintaining political power and support. Here are some examples of how to do this:

- Forge political coalitions that challenge the status quo.
- Build voter demand.
- Leverage “right-to-information” laws to increase decision-making transparency.

Overcoming forests being “worth more dead than alive” entails demonstrating to the powers that be (e.g., in governments, in private-sector firms) that conserved or restored forests result in more positive outcomes for political, business, and human well-being than the status quo. Here are some examples of how to do this:

- Identify and communicate a compelling economic narrative.
- Create new business models.
- Leverage crisis events.
- Leverage trade agreements.

Overcoming the “where’s the money” barrier requires making the case for financing forest conservation and/or restoration and finding sources of financing for which forest conservation and/or restoration earn a return sufficient to meet the investor’s (whether that be a community, a business, or a government) need. Doing so has the potential to shift the decision calculus toward sustaining trees as opposed to clearing them (or preventing them from returning). Here are some examples of how to do this:

- Find new public money for public goods.
- Reform subsidies.
- Embrace REDD+.
- Introduce fiscal transfers.
- Create new business models (to crowd in private money).
- Incorporate the value of forests into public accounts.

Overcoming the “who’s the owner” barrier involves approaches that clarify and secure tenure of individual landowners, communities, and indigenous peoples. Here are some examples of this approach:

- Make the business case for secure tenure.
- Support cadaster processes.
- Map boundaries of indigenous and community lands.
- Invest in institutions and processes for conflict resolution.

Overcoming the “working at cross purposes” barrier involves creating governance approaches or bodies that align management of forests across the myriad agencies that affect them. Here are some examples:

- Improve land-use planning or zoning.
- Strengthen national interagency governance.
- Strengthen national or subnational interagency governance.
- Introduce jurisdictional approaches (diagonal).

Overcoming the “laws on the books but not in practice” barrier entails implementing any of a suite of tactics recommended in the literature for reducing corruption, increasing transparency, and improving law enforcement more widely in society (not just as corruption and law enforcement relate to forests). Such tactics include ensuring an empowered independent judiciary, a free press, well-resourced law enforcement, and more. When it comes specifically to forest conservation and restoration, we highlight three tactics that may be particularly relevant:

- Use information and communication technology (ICT) to safely expose corruption.
- Sustain democratized forest monitoring.
- Implement policies in consumer countries that encourage law enforcement in forest producer countries.

**Finally, when considering approaches to increase public-sector support and investment (in the broadest sense of the term) in forest conservation and restoration, one should think about what public sector decision-makers—including presidents, governors, and agency leaders—care about. We home in on three motivations: Meeting constituent needs, achieving status relative to peers, and forging a legacy.** These motivators of human behavior, however, are too often overlooked. But they are fundamental to what influences decision-makers and “what makes leaders tick.” Efforts to overcome political economy obstacles to conserving and restoring forests should keep these motivators in mind and integrate appeals to these basic concerns into their strategies.



## CHAPTER 1:

# Introduction

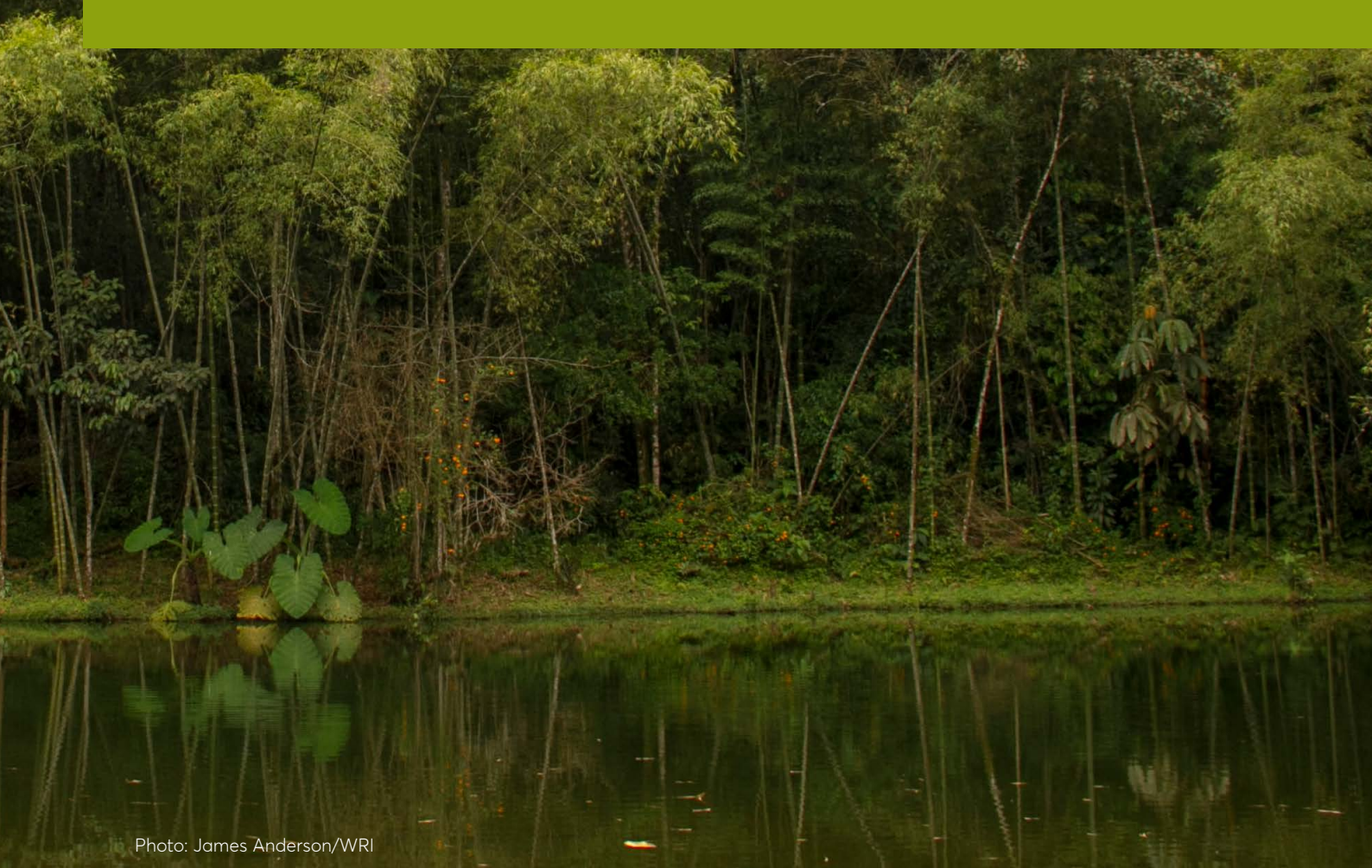


Photo: James Anderson/WRI

The world's forests span nearly 4 billion hectares (FAO 2015). Forests provide a range of benefits, with approximately 1.6 billion rural people depending on them to some extent (Chao 2012). Billions more depend on forests for income and for global public goods such as rainfall and a stable climate.

Despite these benefits, the world's forests continue to suffer from deforestation and degradation.<sup>1</sup> Between 2001 and 2015, the world experienced about 314 million hectares (Mha) of tree cover loss. Large-scale commodity agriculture (e.g., palm oil, soy, beef) was the

primary driver for about 25 percent of this, while smaller-scale agriculture appears to be the primary driver for about 21 percent (Figure 1). Wildfires (some natural, others human-caused) were the primary driver of 22 percent, clearing for forestry products was the primary driver for about 31 percent (but a lot of this could be replanted or allowed to regenerate), and urban expansion the primary driver of less than 1 percent (Curtis et al. 2018). In 2018 alone, tropical forest areas the size of Belgium were lost to agriculture, fire, logging, mining, and other pressures (Weisse and Goldman 2019).

Land-use change, the majority of which is deforestation, and forest degradation currently account for about 11 percent of total net human-made global greenhouse gas emissions (UNEP 2013). Gross emission levels for forest conversion and degradation are even higher.<sup>2</sup> The vast majority of deforestation currently occurs in the tropics, while forest degradation is occurring worldwide (Figure 1). Agriculture accounted for most of the tropical deforestation, while logging and wildfires accounted for much of the degradation (Figure 2).

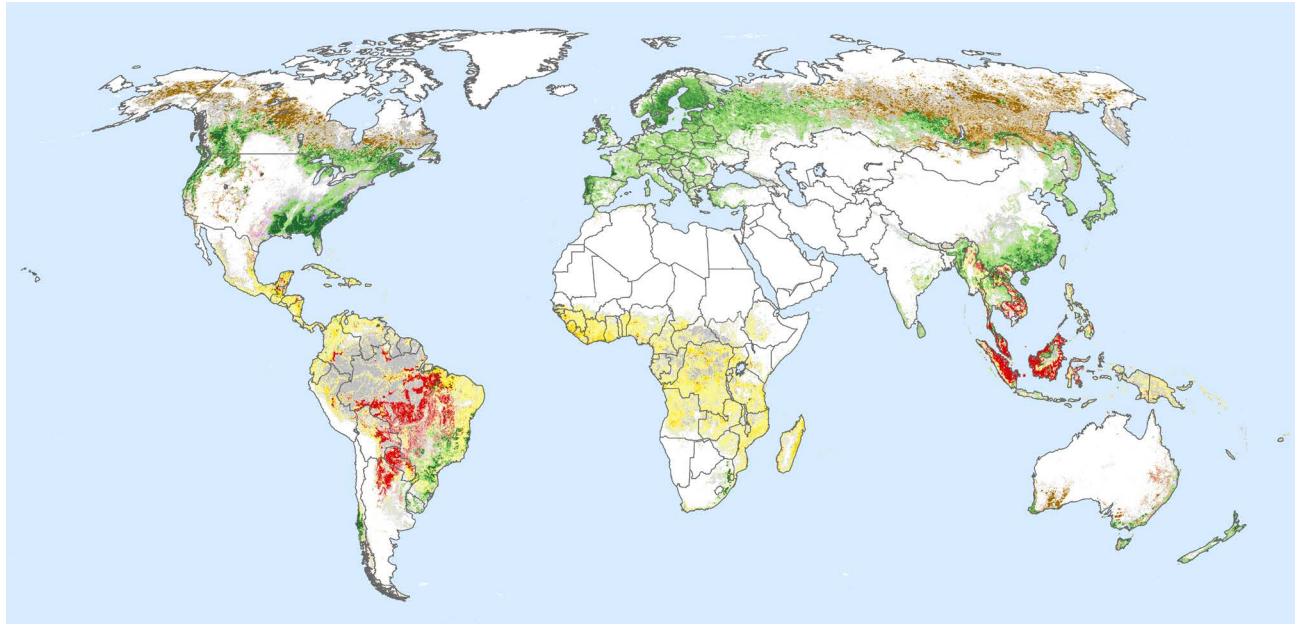
Curtailing this deforestation and degradation, and restoring some of the world's lost forests, is critical to achieving the Sustainable Development Goals and the Paris Agreement on climate change (IPCC 2018). The issue, therefore, is how to achieve this objective. This working paper explores the issue by addressing four questions as they relate to the public sector:<sup>3</sup>

- Why are forests critical to economic development and human well-being?
- What public-sector measures could conserve and restore forests?
- Why haven't these public measures sufficiently worked at scale yet?
- How can one overcome the economic and political economy barriers to these measures?

This working paper is geared toward a generalist audience. Forest sector experts likely will find that the first three chapters synthesize current research, while the last chapter introduces new thinking and framing on how to address economy and political economy barriers to forest conservation and restoration.

FIGURE 1

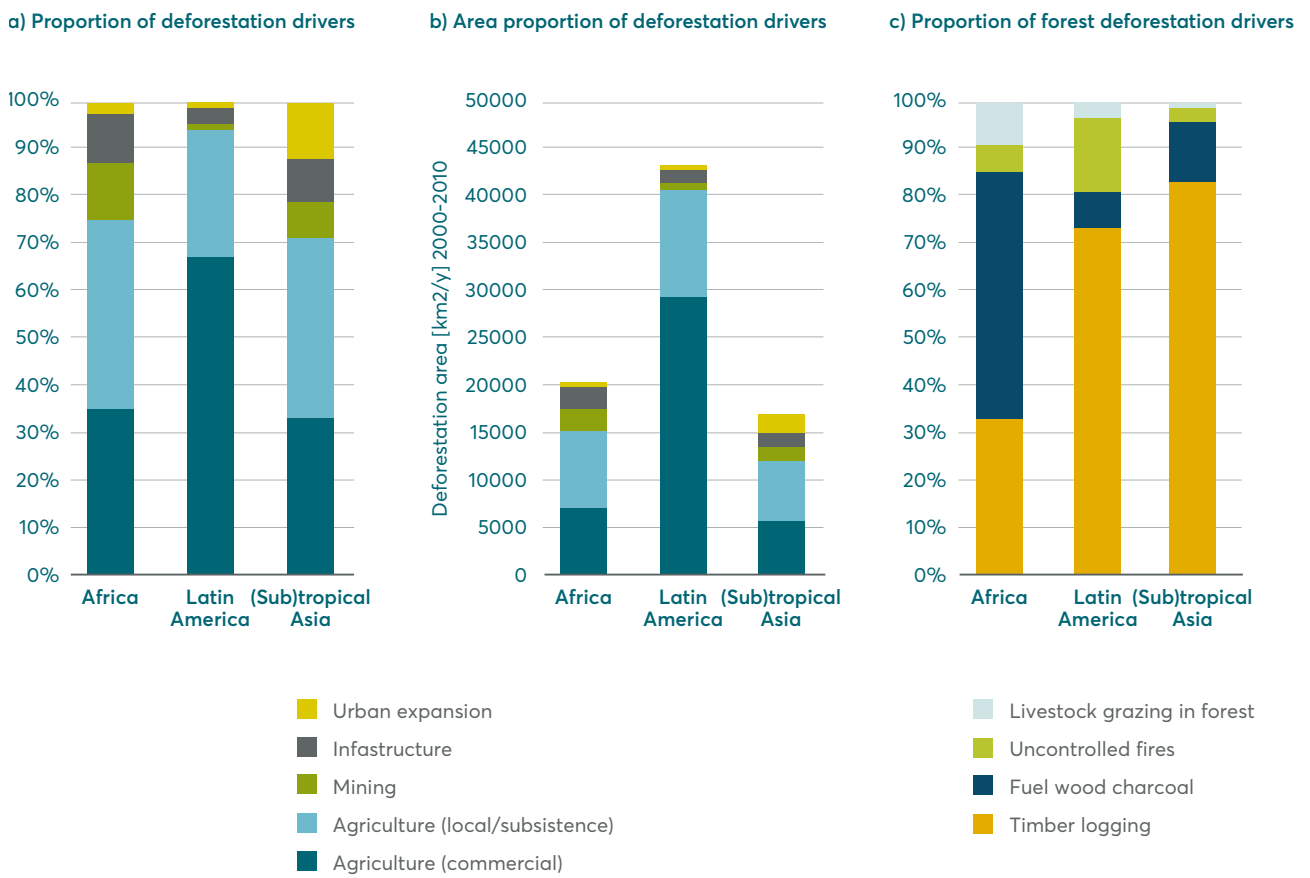
## Primary Drivers of Tree Cover Loss (2001–2015)



Source: Curtis et al. 2018.

FIGURE 2

## Drivers of Tropical Deforestation and Forest Degradation (2000–2010)



Source: Kissinger et al. 2012.

## CHAPTER 2:

# Why are forests critical to economic development and human well-being?



Photo: Kate Evans/CIFOR

Forests are a critical form of natural capital that supports economic development and improved human well-being. In particular, forests provide a range of goods and services that generate income, food, energy, improved health, safety, and global public goods (Figure 3).

### **INCOME AND LIVELIHOODS**

Forests provide income to people through the direct use or sale of goods and services coming from forests. Predominant sources of income include timber and wood-related derivatives (e.g., bioplastics, viscose, charcoal), nontimber forest products (e.g., honey, nuts), and tourism. The global timber sector produces more than 5,000 types of wood-based products and

generates a gross value added of more than US\$600 billion, about 1 percent of global GDP, each year (World Bank 2016).<sup>4</sup> In 2017, the total export value of global forest products reached \$247 billion (FAO 2017). The formal forestry sector employs at least 13 million people across the world, and at least another 41 million are employed in the informal forest sector (FAO 2015). In India, trade in nontimber forest products is the largest informal economy, with an estimated annual value of \$2.7 billion (Pandey et al. 2016). Moreover, citizens around the world enjoy forests for hiking, camping, hunting, bird watching, and other forms of recreation and tourism, thereby creating income-generating opportunities for land owners and forest-dependent communities.

FIGURE 3

## Benefits of Forests to Development and Human Well-Being



Source: Adapted from Seymour and Busch 2016.

Forests are important sources of income across many countries. A survey of 8,000 households living around forests in 24 tropical countries found that 21 percent of the household income derived from natural forests (Wunder et al. 2014). Only a quarter of this was from wood products; the rest came from nontimber forest products. The 21 percent figure for household income was greater than income from wages and livestock and only second behind crops.

Conversely, failure to properly conserve and sustainably manage forests can lead to significant losses of this income for people living in and around forests, as well as for government agencies. For example, global trade in illegal timber alone is estimated to cost governments between \$10 and \$15 billion annually in lost revenues and taxes (Niyogi 2017). The Indonesian forest and peat fires of 2015 cost the national economy \$16 billion through losses in agriculture, forestry, transportation, trade, industry, and tourism, as well as in health costs. These losses were equivalent to nearly 2 percent of the Indonesian economy that year (World Bank 2016).

### FOOD

Forests provide a range of goods and services that directly and indirectly increase food supply for people. In terms of goods, forests are a source of wild game, fruit, nuts, and fungi. These forest-based foods can be critical to the nutrition of some people. In Malawi, for instance, children living in forest areas have more diverse diets and thus greater consumption of nutrients such as vitamin A than those living outside of forests (Johnson et al. 2013). For some communities forests provide an important safety net during times of crop failure or seasonal downturns in agricultural production (Shackleton and Shackleton 2004). Forests in inland and coastal wetlands can be spawning grounds for finfish and shellfish, and some forests provide fodder for livestock that people eat.

In terms of services, forests can help boost agricultural yields by preventing soil erosion, moderating water flows so more water is available downstream during the dry season, and serving as the home of pollinators like insects and bats. For example, animal pollinators are involved in at

least three quarters of the leading types of food crops (IPBES 2016). In tropical forests, forest-based pollinators increase coffee yields by 20 percent within about 1 kilometer of a forest and can improve coffee quality by 27 percent (Ricketts et al. 2004). Forests also provide free pest control. In Indonesia, bats and birds are a form of natural pest control to cacao farmers and can boost their yields by 50 percent (Maas et al. 2013).

The extent of forest cover in a catchment area can also influence its water retention potential. By retaining water, forests can moderate water flows so that more water may be available downstream during a dry season. A European Environment Agency (2015) report that studied 287 sub-basins hosting more than 65,000 catchments across Europe found that, compared to basins with only 10 percent forest cover, total water retention was 25–50 percent higher in water basins where the forest cover was more than 30 percent and 70 percent, respectively. Of course, these hydrologic benefits from forests are shaped by numerous contextual variables; and in some instances, particularly in drier ecosystems, increased tree cover may adversely affect the availability of water for agriculture.

## ENERGY

Forests are a source of energy. Wood contributes 6 percent of the total primary energy supply globally and as much as one-third in developing countries (FAO 2018). Most directly, forests provide fuelwood that people (especially the poor) use for heating and for cooking. More than two billion people—about 26 percent of the world's population—depend on wood energy for cooking and/or heating, particularly in households in developing countries (FAO 2018). But people can demand too much of this benefit; over-extraction of fuel wood in parts of Africa has become a major driver of deforestation (Kissinger et al. 2012).

More indirectly, forests provide energy by securing water supplies for hydropower generation. When located in watersheds upstream of hydroelectric facilities, forests prevent soil erosion and thus reduce siltation of the reservoirs behind dams. Such siltation would otherwise reduce power capacity, require expensive dredging of reservoirs, and/or a reduction in the dam's operating lifespan. For example, in the absence of dredging silt, the estimated lifespan of the Péligre Dam in Haiti has been reduced by a century due

to extensive deforestation in the watershed above the dam (Seymour and Busch 2016). The watershed protection benefit of forests is therefore important for future energy security in countries like Brazil, Colombia, Myanmar, Peru, and Vietnam, which rely heavily on hydropower (Stickler et al. 2013).

## HEALTH

Forests contribute to human health in a number of ways. One is by providing clean drinking water. Nearly 1.7 billion people in the world's urban centers get their drinking water supplies from upstream, forested watersheds (Abell et al. 2017). These forests help ensure the water is clean by preventing erosion and filtering out pollutants before the water gets into the streams and rivers or groundwater that serve as the drinking water source. Without this cleaning function, water quality would deteriorate and/or cities would need to spend a lot of money to ensure clean drinking water. Recognizing this in the 1990s, leaders of New York City opted to conserve and restore forests in the upstream watersheds that supplied the city's drinking water instead of investing in building a new, expensive water filtration system (Gartner et al. 2013). In so doing, the city saved \$6.5–8.5 billion while securing clean drinking for the long term. Other cities such as Bogotá and Quito are following suit, investing in forest conservation and restoration as an approach to secure water for urban residents (Abell et al. 2017).

Another health benefit of forests is medicine. More than 70 percent of people in developing countries use traditional medicines, and about one-quarter of the world's pharmaceuticals are derived from wild plants or their properties (Seymour and Busch 2016). The global economic value of the annual market for traditional medicines derived from forest plants was estimated at \$60 billion in 2002 (WHO 2002). Much of these medicines invariably come from forests. Famously, Madagascar's rosy periwinkle is the source of effective drugs to combat Hodgkin's lymphoma and other forms of cancer.<sup>5</sup>

A third benefit of forests is clean air. Forests generate oxygen, hence they are often referred to as the "lungs of the earth" (although this title should rather go to the combination of forests and oceanic plankton). Forests can cleanse the air of pollutants. Conversely, when forests are burned, the resulting smoke and haze release a number of pollutants ranging from soot to

carcinogens. Johnston et al. (2012) estimate that premature deaths globally from forest fires range from 250,000 to 340,000 per year. And Koplitz et al. (2016) estimated that haze from the 2015 forest fires in Indonesia caused at least 100,000 premature deaths.

Forests also can help prevent the spread of some infectious diseases. Malaria is a case in point. Intact forests are home to insectivores that eat malarial mosquitos and have cooler temperatures, which slow the pace of larval growth. But as tropical forests in malaria zones are cleared, conditions conducive to the mosquito vector increase. There are more pools of standing water for breeding; ambient temperatures are warmed due to more direct sunlight, which accelerates larvae growth; and insectivore populations decline (Afrane et al. 2005). This increases the *risk* of malaria in deforested zones, although actual incidence of the disease may be mitigated by other factors (Bauhoff and Busch 2018). Deforestation has been tied to a rise in incidences of other diseases, as well, including West Nile virus, schistosomiasis, hookworm, and yellow fever (Wilcox and Ellis 2006).

## SAFETY

Depending on where they are located, some forests can reduce the impact of natural hazards and thereby improve human safety. One natural hazard that forests can help attenuate is landslides and avalanches. Forests on slopes protect soils from the direct impact of rain, quickly move water away from the surface, and hold soils in place via their root systems. Thus, when heavy rain events occur, a forest on a slope can prevent or reduce the impact of landslides. In fact, the absence of forested slopes has contributed to the dramatic landslide events and loss of life and property over recent years in places ranging from the Philippines to Brazil (Forbes et al. 2011).

Forests can reduce the impact of small floods. Forests do this by soaking up vast amounts of water and moving it into the air via evapotranspiration or underground via root systems. In the Upper Yangtze River Basin in western China, for instance, the flood mitigation provided by forests saves an average of 6.5 billion RMB about \$1 billion) annually from storm and flood damage in the region (Fu et al. 2013).

Forests also can reduce the impact of waves from storm surges, cyclones, and even tsunamis (for areas far enough away from the epicenter).

Mangrove forests, for instance, trap sediment and thereby build up shorelines. Mangroves also bear the brunt of wave and tidal energy, buffering infrastructure and inhabitants further inland. Moreover, mangroves prevent seawater from entering inland and protect underground water systems (Ridd and Sam 1996). During the Indian Ocean tsunami of 2004, coastal villages in India, Sri Lanka, and parts of Indonesia that were located behind wide areas of mangroves experienced far less damage than those not protected by a mangrove (Kathiresan and Rajendran 2005; Marois and Mitsch 2015). Analytical models suggest that 30 trees per 100 m<sup>2</sup> in a 100 m wide belt can reduce the tsunami flows by up to 90 percent (Hiraishi and Harada 2003). Moreover, Beck et al. (2018) estimate mangroves protect 18 million people from risk of flooding each year. They further estimate that without mangroves, annual flood damages would increase by up to \$82 billion a year. Conserving and restoring mangroves, therefore, are important to human safety and can be economical. In Vietnam for instance, extensive planting of mangroves has cost only \$1.1 million and reduced the maintenance costs of a sea dyke by \$7.3 million per year (Brown et al. 2006).

## GLOBAL PUBLIC GOODS: BIODIVERSITY, CARBON, AND RAINFALL

Finally, but just as importantly, forests provide a number of global public goods. Three are worth noting in particular. First, forests are the ecosystem that supports the most biodiversity on the planet.<sup>6</sup> More than three-quarters of the world's terrestrial biodiversity call forests home (FAO 2018). Tropical rainforests in particular are species rich, having about 50 percent of terrestrial animal and plant life (WCMC 1992). Protecting and restoring forests could slow down alarming species extinction rates, currently estimated to be more than 1 million in the next several decades (IPBES 2019).

Second, forests capture atmospheric carbon dioxide and store it as carbon in vegetation and soils. As such, forests play a critical role in the world's carbon cycle and in global efforts to combat climate change. Considering just tropical rainforests (the hotspot of deforestation in the 21st century), halting deforestation could avoid 16–19 percent of human-caused greenhouse gas emissions per year. Allowing (or actively facilitating) tropical forest regrowth could offset an additional 8–11 percent of emissions. Thus,

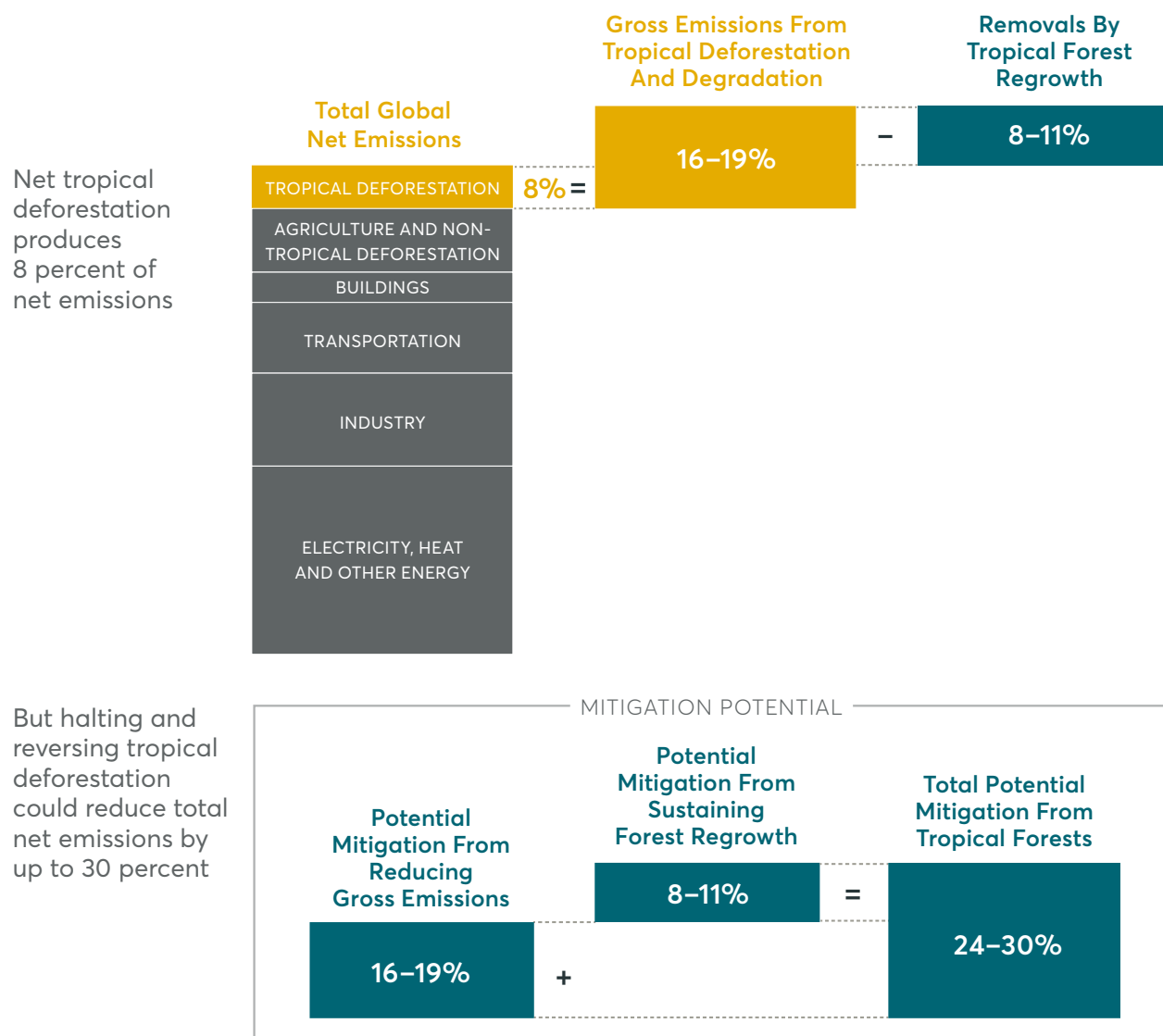
the climate mitigation benefits of tropical forests alone could be 24–30 percent of annual emissions (Figure 4).

Third, but very often underappreciated, forests play in role in generating rainfall for downwind agricultural areas. Forests generate a lot of water vapor via evapotranspiration. In fact, studies show that air currents floating over forests create a lot more airborne moisture than those that cross open land (Sheil 2014) Because of this, forests are in part the rain generators for downwind farms and ranchlands. Conversely, large-scale forest clearing can lead to less rainfall across entire regions and even extend dry seasons (Lawrence

and Vandecar 2015; D. Ellison et al. 2017). Nowhere is this effect more a threat than in the Amazon region. Continued forest clearing could lower production per hectare of soy and cattle in the surrounding agricultural zones (Seymour and Busch 2016). Moreover, because of global wind cycles, changes in forest extent on one continent could have impacts on agriculture on another. Global climate models, for instance, indicate that deforestation in the Brazilian Amazon can lower rainfall in the U.S. corn belt (Avisar and Werth 2005). Thus, contrary to common perception, forests do not stand in the way of agricultural development but in many ways underpin some of agriculture’s productivity.

FIGURE 4

## Climate Mitigation Potential of Tropical Forests



Seymour and Busch 2016 (citing Pan et al. 2012).



## CHAPTER 3:

# What public measures could help conserve and restore forests?



Photo: Aaron Minnick/WRI

In light of the economic, social, and environmental value of forests, what can governments do to conserve and restore forests? History indicates that a number of public sector measures have proved effective (or show promise to be effective) at forest conservation

and/or restoration (Table 1). In other words, governments *do* have effective measures available to them to protect and restore forests if they can mobilize the political will to fix market and governance failures.

TABLE 1

## Measures for conserving and restoring forests

Category	Measure	Description	Applies to	
			Conservation	Restoration
Reduce supply of land available for deforestation	1. Do not make public land available for conversions	Refrain from handing out or selling publicly owned forests	X	
	2. Place moratoria on forest conversion	Pass laws preventing forests from being converted to agricultural land	X	
	3. Establish protected areas	Establish protected areas in regions where forests face high threat	X	X
	4. Secure tenure and protect indigenous territories	Clarify and secure land tenure for indigenous peoples and others who depend on forests for their livelihoods	X	X
	5. Build climate-smart roads	Minimize intrusion of new roads into forested areas	X	
Increase risk associated with deforestation	6. Enforce the law	Enforce laws, which are often already on the books, designed to protect forests	X	X
	7. Develop conversion-free supply chains	Make soft commodity (e.g., palm oil, soy, beef) procurement contracts conditional on farmers/ranchers avoiding deforestation	X	X
	8. Improve transparency	Make data on forest cover and forest cover change (where, when, who) public	X	X
Reduce demand for alternative use of (once) forested land	9. Sustainably intensify agricultural production	Support increases in crop and livestock yields (production per hectare) on existing agricultural land in a sustainable manner, thereby reducing the need to convert more land into agriculture (and ultimately liberate less productive agricultural land to return to forest)	X	X
	10. Decrease agricultural commodity demand	Reduce demand for land-intensive food (e.g., beef) and agriculture-based energy commodities (e.g., biofuels that require dedicated use of land)	X	X
	11. Increase relative financial attractiveness of trees vs. no trees	Reduce the financial attractiveness of deforestation and of keeping trees off land and/or increase the financial attractiveness of forest conservation and restoration (e.g., revenues from ecosystem goods and services)	X	X
	12. Strengthen decentralized resource management	Ensure that forest governance system allows local participation in conservation and restoration, and in ways that benefits flow to people and communities	X	X

Note: \* While this measure is primarily driven by the private sector, governments can play a role by encouraging private-sector actors to establish such conversion-free supply chain contracts or by making selected political jurisdictions deforestation-free.

Source: Developed by authors, building on a framework presented in Seymour and Busch (2016).

## REDUCE THE SUPPLY OF LAND AVAILABLE FOR DEFORESTATION

The first category of measures reduces the amount of forested land that is available for deforestation. In essence, each of the following measures, in its own way, shrinks the supply of land for conversion:

- 1. Do not make public land available for conversion.** A direct measure governments can use to protect forests from conversion is to stop giving forests away or selling or leasing the land to those who plan to convert it to agriculture or some other, non-natural land use. This measure is relevant because, in much of the world, governments claim ownership of the majority of natural land, and conversion occurs when they grant the right to convert. In Indonesia, for example, the national government controls nearly all forest (subject to possible claims by indigenous peoples as a result of a Constitutional Court ruling) (Butler 2013). This land can become available for agricultural development through reclassifications granted by the national forest agency on application by private companies (Rosenbarger et al. 2013). By refusing to reclassify these lands, the national government can protect forest from agricultural conversion if it so chooses. However, politically influential companies and/or officials associated with land use can derive revenues from land use concessions and transfers, posing a political economy challenge (Mulyani and Jepson 2013)

In parts of Latin America, the acquisitive prescription doctrine has allowed those who clear public forest for farming to acquire ownership after a few years. Even though this claim to public land may be restricted to farms of a certain size, large landowners can subsequently come in and assemble large estates from the original claimants. In Colombia, for example, the principle of acquisitive prescription dates back to the original civil code. A 2002 law shortened the waiting period to acquire ownership from ten to five years after the forest has been converted to agricultural or similar productive use. One of the purposes of this legal doctrine is to prevent the possible

injustice of a person abandoning land then returning to claim it after someone else has taken it over and put it to productive use. In Latin America, the principle was usually established to encourage conversion of natural lands to agricultural use. It allows seizure of government land and therefore allows people to claim ownership by clearing government-owned forest (Recio 2015). Changing such laws is fundamental to forest protection.

In Costa Rica and Brazil, changing laws on land titling so that people can no longer acquire title to land by simply clearing it has played an important role in reducing deforestation (Assunção et al. 2015; Nepstad et al. 2014; L'Roe et al. 2016). Land titling laws can be effective in preventing conversion to cropland because such conversion involves substantial investment. If those who illegally convert fear that their claims to land ownership will not be recognized and their future farm income jeopardized, then the incentive to convert will be reduced. Unfortunately, although Brazil no longer promises legal title to those who deforest, it has a history of retroactively granting rights to those who illegally did so (Do Carmo 2017). This can encourage new cycles of illegal land clearing.

In India, more than 90 percent of forest area is owned by the state. The conversion of forests for development purposes, including mining infrastructure development and industrial development, is governed by the Forest Conservation Act of 1980. The act requires lengthy processes for clearances, as well as compensatory afforestation. Strict enforcement of this legislation in letter and in spirit can limit forest conversion and support restoration. However, a push to improve ease of doing business and derive revenues from land conversion dilutes the law. Since 2000, more than 1 Mha of forestland in India has been diverted for development use, generating more than \$7 billion in compensatory fees that flow to state forest departments and provide a perverse incentive for forest diversion.

While governments can control how and where private parties may claim ownership or rights to develop public lands, in some cases they must attempt to strike a difficult balance between enforcement of land-use restrictions and the needs of impoverished smallholders (Wormington 2016). Where farmers have clear title to their land, governments can combine enforcement with support for agricultural improvement on existing farmland to build social support.

- 2. Place moratoria on forest conversion (to agriculture).** Another approach to protection is to declare natural forests off limits for conversion to agricultural use. This applies to cases of privately held lands or public lands on which private concessions have already been granted (differentiating it from item 1 above). In such cases, governments can pass laws restricting further conversion. In addition to providing direct protection, moratoria can induce a market and political signal that the availability of natural ecosystems to access and convert is dwindling, and thus agricultural interests should instead increase investment in extant croplands and pasturelands.

Governments can establish moratoria that target a specific ecosystem, a specific land use, or both. For example, starting in the 1990s, the United States had a “no net loss of wetlands” policy that curtails the conversion of wetlands into farmland or other uses (Ruhl and Salzman 2006). In 2011, Indonesia put in place a moratorium on granting new agriculture and logging concessions in primary forests and peatlands (Austin et al. 2014). Following the 2015 fires, the moratorium on opening peatlands was extended to cover areas already licensed but not yet developed. Costa Rica passed a law in 1996 prohibiting further forest conversion. The law has been mostly effective, even though not perfectly enforced (Cameron 2016). A study of productive lands in northern Costa Rica between 1996 and 2010 showed that the deforestation ban in 1996 cut in half but did not eliminate conversion of mature forest to cropland—in this case mostly pineapple and banana plantations (Fagan et al. 2013).

Moratoria can arise from the private sector, as well. In 2006, for example, members of the Brazilian Vegetable Oils Industry Association and the National Grain Exporters Association committed to a moratorium on the production and trade of soybeans grown on lands in the Brazilian Amazon that were deforested after July 24 of that year (Rudorff et al. 2011). The moratorium has been quite effective in the Brazilian Amazon. During the two years before the moratorium, 30 percent of soy expansion in the Brazilian Amazon occurred on newly deforested land. Since the moratorium, the amount dropped to about 1 percent; approximately all 1.3 Mha of new soy plantings from 2006 to 2013 in the region were on previously cleared lands (Gibbs et al. 2015). Moreover, the moratorium did not undermine Brazil’s soybean industry. Since implementation, soy production has continued to grow.<sup>7</sup> However, there has been a shift in deforesting activities (i.e., leakage) to the Brazilian Cerrado (Dou et al. 2018). Efforts to contain leakage need to be more comprehensive for moratoria to fully realize their potential.

- 3. Establish protected natural areas.** Although the mere designation of protected areas does not guarantee protection from deforestation, studies have generally found that such designations typically result in lower levels of deforestation (Dasgupta 2017a).<sup>8</sup> In their global review, for example, Busch and Ferretti-Gallon (2017) found that areas of land designated as a protected area (e.g., national park, wilderness area, national monument) were consistently associated with lower levels of deforestation (Figure 5). The study concluded that the efficacy of protected areas was probably a result of the heightened legal protection, remoteness, and/or poor agricultural potential.

The latter two features highlight a requirement of future policy. Natural areas that might be good for agriculture are typically not chosen to become protected areas. But in some parts of the tropics, it is precisely these lands that are most at risk of deforestation. Going forward, an important strategy will be to establish a string of protected areas to block the path of

agricultural expansion and thereby further encourage boosting yields on existing agricultural lands. Part of Brazil's success in reducing deforestation in the Amazon from 2004 to around 2015 was establishing new protected areas in the arc of deforestation.

Not all forms of protected areas equate to "no human activity within the area."<sup>9</sup> Protected forest areas today are diverse in their use rules (UNEP-WCMC and IUCN 2018) and in the range of actors involved, including communities, civil society organizations, and others (Miller and Nakamura 2018). Community concessions, for instance, have gained ground in several countries, including Bolivia, Chile, Indonesia, and the United States—according rights of access, management, and exclusion in public forests (K. Ellison 2008; Schleicher 2018). The impacts of protected areas on local livelihoods can be varied, with positive

impacts associated with co-management regimes that integrate local communities as stakeholders (Oldekop et al. 2016).

4. **Secure tenure and protect indigenous territories.** Recognition of indigenous lands and, more broadly, clarifying and securing tenure for people who live in or near forests and rely on forests for their livelihoods, regardless of their status as Indigenous or not, can reduce deforestation and degradation (Stevens et al. 2014; Seymour et al. 2014; Solorzano and Fleischman, 2018). Overlapping claims to land between governments, communities, and/or corporations is often manifest in conflicted land uses, muddies accountability for resource management, and undermines the incentives for conservation and restoration. In Peru, for example, overlapping concessions for agriculture, mining, and

FIGURE 5

## Factors Consistently Associated with Less or More Deforestation



Note: For example, a ratio of 4x indicates that a variable is associated with less deforestation four times as often as it is associated with more deforestation.

Source: Busch and Ferretti-Gallon 2017.

timber undermined the livelihoods of 15,000 to 20,000 people as well as export revenues amounting to \$14 million in 2010 (Chavez et al. 2012). In India, overlapping claims among different government departments is adversely affecting more than 1.2 Mha of land and the livelihoods of an estimated 1.5 million people, mostly tribal families (Chaturvedi, Shelar, and Singh 2018).

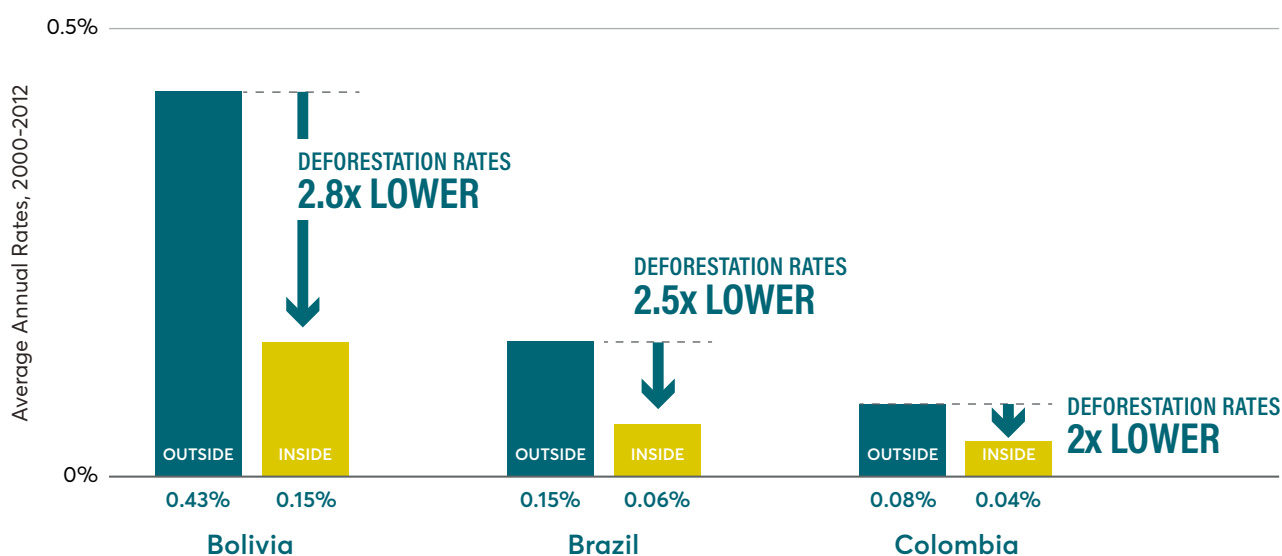
Once tenure is clear, it is vital to secure it either through the creation of protected areas (described above) or through the recognition of indigenous and community lands—and enforcement of these recognitions. The conservation of forests in indigenous territories in the Xingu watershed of Brazil is a well-documented case, where tribes guard the forests against illegal loggers, miners, and other intruders while forests continue to be cleared outside the territories. Blackman et al. (2017) found that community titling of indigenous lands significantly reduced both forest clearing and disturbance in the Peruvian Amazon. Ding et al. (2016) found the same in several Amazonian countries (Figure 6).

Security of tenure enables indigenous and local communities to directly benefit from conservation and restoration, thereby strengthening their incentive for maintaining or increasing tree cover. If local people are unable to capture any of the benefits of forests, they will not find it in their interest to keep those forests. Benefits flowing to communities could include sustainably harvested wood, nontimber forest products, improved water quality, rights of way, or other benefits. This follows the basic principle that people will conserve and/or restore those things that bring them value. In Niger, for instance, legal reform that transferred ownership of trees from the state forest agency to local farmers and communities was a key ingredient to catalyzing farmer-managed regeneration at a massive scale—over five Mha in 20 years (Sendzimir et al. 2011; Buckingham and Hanson 2015).

Establishing (where absent) and supporting (where present) indigenous territories and securing tenure play an important role in conserving forests and other natural ecosystems and, regardless, is justified on its own accord for the sake of respecting human rights.

FIGURE 6

## Less Deforestation Associated with Tenure-Secure Lands



Source: Ding et al. 2016.

**5. Plan climate-smart road networks.** The location of roads can have a huge effect on the protection of natural ecosystems. In fact, in the Brazilian Amazon, 95 percent of deforestation has occurred within 5.5 kilometers (km) of a road or 1 km of a navigable river (Barber et al. 2014). Roads make it easier for people to access previously uncleared forests or other ecosystems. Over time, the first road leads to feeder roads and offshoot roads. Economic activity starts to grow, especially extractive and agricultural activities, and vested interests in further clearing (and road building) emerge. Not surprisingly, Busch and Ferretti-Gallon (2017) found the presence of roads to be consistently associated with higher levels of deforestation.

The simplest approach to avoid this typical progression is to prevent roads from entering pristine areas at all. But road-building is critical for agricultural and other improvement in poorly served areas, such as many parts of Africa. So how does one align these competing needs? One solution is to plan and build climate-smart road systems that avoid incursion into remaining natural ecosystems while enhancing the ability of the agricultural sector to access markets. This entails focusing road building in existing agricultural areas, particularly where there is high potential for agricultural improvement. Barber et al. (2014) identified some priority areas on a global level for increasing roads and for avoiding road building based on essentially climate-smart principles. For example, areas of Africa with very poor roads could reap great benefits from merely improving existing roads (e.g., paving dirt roads), not necessarily adding new roads. In general, this approach is precisely what needs to be undertaken at high resolution at the national and subnational levels and then incorporated into government infrastructure plans.

Unfortunately, even if this kind of mapping were fully implemented and followed, roads that threaten natural areas will be built for reasons other than to link farms. Countries, for instance, will build other roads to access mining areas or to create networks between countries. In these situations, any solution will be highly imperfect, but the best

opportunities involve locating roads to avoid the most sensitive areas and putting in place buffer zones or protected areas along roads before the roads are built (Caro et al. 2014; Damania et al. 2016).

## **INCREASE RISK ASSOCIATED WITH DEFORESTATION**

The second category of measures make it expensive (politically, economically, legally, reputationally) to convert forests into agricultural land or other use:

**6. Enforce the law.** The above measures discussed earlier work well only if they are combined with consistent enforcement. In fact, the factor that Busch and Ferretti-Gallon (2017) found to be most consistently associated with low levels of deforestation was enforcement of forest protection laws. Protected areas without enforcement are just paper parks, while a moratorium without enforcement is a land grab. Law enforcement can take the form of fines (e.g., for illegal clearing or deliberate forest fires), seizure of illegally converted lands (or livestock grazing on them), evictions of illegal squatters, and arrests of illegal ranchers. Three features could help make enforcement credible and politically supported over the long term. First, the stick of law enforcement should be complemented with the carrot of positive economic incentives for those people who might be most affected. Second, legal frameworks need to avoid being unjust or repressive, particularly toward marginal communities. Where laws themselves are biased against poor or marginalized communities, these need to be amended. Third, law enforcement needs to be fair; it should not selectively go after the poor while letting the rich and politically powerful go untouched.<sup>10</sup>

**7. Implement conversion-free supply chain contracts.** Buyers, traders, and financiers of agricultural commodities can choose to purchase or finance only commodities that are not linked to deforestation or conversion of other natural ecosystems. Conversion-free purchasing policies have the potential to persuade farmers, agricultural companies, and even political jurisdictions (e.g., districts, states) to meet growing demand by boosting yields on existing agricultural land (or restoring degraded

areas into commodity production for cocoa, coffee, or oil palm) instead of by expanding agricultural area. Otherwise, these farmers, agricultural suppliers, and jurisdictions risk losing business customers, market access, and finance. Governments can help nurture such conversion-free supply chains by ensuring clear zoning regulations, enforcing the law, and collaborating with the private sector to create sustainable jurisdictions (see “jurisdictional approach” in Chapter 5).

The most notable conversion-free supply chain commitment is that of the Consumer Goods Forum (CGF). CGF comprises 400 of the world’s leading consumer goods manufacturers and retailers from 70 countries with combined annual sales of about \$2.8 trillion (€2.5 trillion). In 2010, the board of the CGF committed to achieving zero net deforestation in supply chains for four commodities by 2020 and to curtail procurement from suppliers who do not comply. Financiers of agricultural commodities are taking steps, too. A number of banks have agreed to a soft commodities compact designed to support business customers in their efforts to reduce commodity-driven forest conversion (CISL 2014).

To realize its potential, however, the conversion-free supply chain model needs more companies and financial institutions to make conversion-free supply chain commitments—such that together they account for a significant share of market demand (or financing) of each agricultural commodity. Otherwise, there is a risk of sizable market leakage whereby suppliers merely divert deforestation-linked agricultural commodities to a large market of buyers that have not made commitments. Most importantly, however, early adopter companies and banks need to follow through on their commitments. Too few to date have been able to show demonstrable progress on fulfilling their conversion-free commitments. Initiatives such as the accountability framework now provide a comprehensive set of metrics against which companies can track and report their progress. And follow-through requires monitoring and accountability mechanisms (Taylor and Streck 2018). Given that the commitments

for 2020 are unlikely to be met, how the CGF and other industry players respond and adjust their strategies will be critical to the future success of this approach.

- 8. Increase transparency of land-use and land-cover change.** All the approaches to protecting natural ecosystems listed above benefit from adequate spatial monitoring which can detect adherence to and violations of the law and land designations. Significantly enhanced transparency made possible by modern-day monitoring technologies (e.g., satellites, drones, cloud computing, the internet) can be a powerful foundation for accountability and enforceability. Technology’s efficacy at reducing illegal deforestation in the Brazilian Amazon from the mid-2000s to the mid-2010s has been demonstrated by the DETER and PRODES systems (Assunção 2013). The Global Forest Watch system now has several satellite-based monitoring systems on its platform, capable of detecting the felling of trees at various spatial and temporal resolutions, and combines that data with maps of protected areas, indigenous reserves, moratorium boundaries, extractive industry concessions, and more.<sup>11</sup> Combined with transparency about commodity supply chain relationships and the financing or ownership of commodity companies, these technological advancements can give rise to an unprecedented radical transparency that can combat deforestation and degradation, as well as support restoration.

## REDUCE DEMAND FOR ALTERNATIVE USE OF (ONCE) FORESTED LAND

The third category of measures reduces the (economic) pressure or incentive for an alternative use of forested land (primarily agriculture) and/or reduces the pressures that keep trees from recovering on land that was once forest:

- 9. Pursue sustainable intensification of agriculture.** Boosting crop and livestock output per hectare is a way to meet increases in food demand without land-use change (Searchinger et al. 2018). In theory, yield gains reduce the amount of land needed to produce a given amount of food, thereby reducing pressures to convert forests, grasslands, and wetlands



into agriculture and even enabling marginal lands to recover into natural ecosystems (e.g., reforestation) (Strassburg et al. 2014; Spera 2017). Yield enhancements (or the opening up of grasslands elsewhere with higher crop yield potential combined with the rise of urban job markets) are a major reason for the regrowth in forest cover in the United States and Europe since the early 1900s (Hanson et al. 2015).

Ironically, yield gains can also accelerate land shifting and local expansion of agricultural land, particularly in developing countries (Angelsen and Kaimowitz 2001; Ewers et al. 2009; Rudel et al. 2009). Initial studies struggled to explain this phenomenon, and some even suggested that yield gains might increase not only local but also global land use for agriculture. But more recent research has pointed out that expansion occurs at the country level when increased yields lead to greater competitiveness and more exports for that country (Searchinger 2012; Hertel et al. 2014). In effect, yield gains do tend to reduce the area of land used by agriculture globally when compared to the alternative scenario of growth in food demand without yield gains.

But yield gains can also increase agricultural area in those regions where the yield gains occur. This can occur because of a local production rebound effect (Hertel et al. 2014). Yield gains, even if they spare land globally, may encourage local conversion of forests, grasslands, and other natural ecosystems by lowering local production costs. In other words, yield gains can improve the economics per hectare for farmers, thus incentivizing farmers to put more hectares into production to increase total profits. This pattern likely underpins expansion of soybeans, maize, and beef in Brazil and Argentina, and of oil palm in Indonesia and Malaysia. This kind of land shifting does not occur because of yield gains *per se*. If all countries increased their yields in a way that lowered production costs by the same amount, no country would gain a competitive advantage.<sup>12</sup> The shifting occurs when yields increase and production costs decrease in some countries more quickly than in others. The countries whose yields grow and costs decline more gain a comparative advantage

in growing those crops or livestock and therefore expand the land area dedicated to those commodities.

One solution to preventing such local production rebound effects is to boost yields while at the same time implementing policies that curtail conversion of forests (measures 1–8 above). Improvements in production and improvements in protection need to be linked.<sup>13</sup>

At the same time, it is vital to recognize that many of the rural lands available for intensification are cultivated by smallholders who may not have the resources available to absorb the costs—whether direct costs or opportunity costs—associated with intensification (Liao and Brown 2018). Therefore, measures to improve their well-being must be incorporated into the design of interventions for scaling restoration and conservation.

- 10. Reduce demand for agricultural commodities.** As demand for land-intensive agricultural commodities declines, the demand for forest conversion to croplands (and the incentive to continue activities that keep trees from recovering on a tract of once-forested land) would decline, too. One example of this type of commodity is beef in that cattle require a lot of pasture; about 40 percent of current cattle grazing land in the world was once forest (Searchinger et al. 2018). Another is crop-based biofuels, which, on a hectare basis, are an inefficient converter of sunlight into usable transportation fuel or electricity (Searchinger et al. 2019). As such, biofuels require a lot of land, land that in most cases otherwise could support trees (or support food and feed crops and thereby reduce the latter's pressure on forest conversion). In *Creating a Sustainable Food Future* (Searchinger et al. 2019), WRI, the World Bank, UNDP, and UNEP describe a number of approaches for reducing demand for such agricultural commodities, such as halving the rate of food loss and waste, reducing growth in demand for land-intensive foods such as beef, avoiding government targets and subsidies for biofuels, and implementing women-empowerment initiatives to help all portions of the planet achieve replacement level fertility.

**11. Change the relative financial attractiveness of trees versus no trees.** There are multiple ways to reduce the financial attractiveness of deforestation and of keeping trees off land, as well as to increase the financial attractiveness of forest conservation and restoration. Methods of reducing financial attractiveness include trimming or eliminating subsidies that support economic activities that drive deforestation and the continued absence of trees. Methods of increasing financial attractiveness include payments for ecosystem services (PES) for standing forests or forest restoration, markets for certified sustainable timber and nontimber forest products coming from existing or restored forests, and planting trees that increase crops yields or provide other products that support smallholder livelihoods via agroforestry.

For instance, sustainable forest and other product certification programs have the potential, albeit not yet fully realized, to increase the financial attractiveness of standing forests. Demand exists. Today, more than 55 percent of the sustainability commitments made by companies reference the use of certification systems (e.g., on timber, palm oil) to realize their pledges (Donofrio et al. 2017). Supply exists, as well. Certification programs like the Forest Stewardship Council and the Programme for Endorsement of Forest Certification together cover more than 500 Mha of forests (Dasgupta 2017b). Much of this certification however, is concentrated in North America and Europe (including Russia). To send the right signal to where the threat of deforestation is greatest, certification needs to expand to forest-rich countries in Asia, Latin America, and Africa (van der Ven and Cashore 2018). In the palm oil sector, standards of the Roundtable on Sustainable Palm Oil, which has clear “no deforestation” requirements, cover about 17 percent of the sector and are gradually increasing.

Changing the relative financial attractiveness will require careful consideration of both positive and negative financial signals at the same time. A case in point is the transition of Costa Rica from a country with net deforestation to one with net reforestation. Costa Rica is commonly known for its PES

schemes introduced in the mid-1990s that paid landowners for avoiding deforestation and planting trees—all of which are forms of positive incentives (Pagiola 2008). But a review of the historic timeline suggests that removing negative incentives arguably had more to do with the country’s forest success than the PES system. To elaborate, in 1969, the government introduced tax deductions for reforestation, which evolved into special loans for restoration and later into direct payments for restoration. Then in the mid-1980s, the country slashed its cattle ranching subsidies to reduce government debt and meet the structural adjustment requirements of the World Bank; the herd fell by at least one-third. The PES scheme was introduced in 1996 (Buckingham and Hanson 2015).

Tree cover in the country continued to decline during the 1970s, the period of the first suite of positive incentives. The country did not turn the corner on forest cover until the late 1980s, with a steep decline in deforestation rates and a dramatic increase in forest cover. This transition was just after the reduction in cattle subsidies, yet nearly a decade before the introduction of the PES scheme (Sanchez-Azofeifa et al. 2007). This history suggests that negative incentives that keep trees off of land (e.g., cattle ranching subsidies) can outweigh positive incentives for restoration (e.g., tax deductions). Positive incentives, therefore, should not be considered in isolation. Nevertheless, it is likely that introducing the PES system helped sustain political support (e.g., by landowners) for the country’s pro-forest policies. It may have served as “sugar” to “keep the medicine down.”

**12. Strengthen decentralized, participatory forest management.** Strengthening forest decentralization through comanagement regimes that involve local people and communities can contribute to combatting barriers to conservation and restoration—such as illegal logging, corruption, encroachment, and degradation—while also strengthening the flow of benefits to forest-dependent communities (Lemos and Agrawal 2006; Agrawal et al. 2008; Davis et al. 2014).<sup>14</sup> In Nepal, the Community Forest Act of 1993 created the regulatory support for local

involvement in management and harvesting of forest resources. In less than a decade, this legislation led to the creation of 11,000 forest-user groups which were managing 850,000 hectares of public forestlands. With the introduction of comanagement regimes, local communities have emerged as major investors in forests, contributing time, labor, and finance toward conservation and restoration (Molnar et al. 2004). In the 2000s, estimates suggested that communities were roughly investing \$1.2–2.6 billion per year, which matched national budgets toward protected areas and outdid Overseas Development Assistance to the forest sector (Khare 2003).

It is estimated that today more than 700 Mha of forests is managed by communities, with or without formally recognized title (Gilmour 2016). An assessment of forest management in 64 countries further suggests that community-managed forests store at least 17 percent of the total carbon stored in forestlands, equivalent to 33 times the global energy greenhouse gas emissions of 2017 (RRI et al. 2018).

It should be noted that the appropriate mix of measures discussed in this chapter will depend strongly both on the drivers of deforestation and degradation in a particular jurisdiction, as well as on the characteristics of relevant government agencies, including accountability and capacity. For example, the approaches to law enforcement are likely to be quite distinct in situations where corporate actors or criminal organizations are involved in large-scale clearing

versus situations where desperately poor people are clearing forests to survive. These approaches also would be different when rights to land are secure than when they are contested. Moreover, enforcement would be contingent on the capabilities of authorities, as well as the infrastructure available to them (Seymour and Harris 2019).

Of course, any one of these 12 measures alone likely will be insufficient; it is the combination of two or more that has impact. Brazil from 2004 to 2015 illustrates this point. The country has long had laws restricting the percentage of land on any farm that may be cleared (the Forest Code), yet enforcement lagged. Beginning around the mid-2000s, however, Brazil moved to enforce these laws; the government reorganized its police enforcement and took actions against corruption such that law enforcement could be more effective. The country started using satellite monitoring (i.e., the DETER and PRODES systems) to identify illegal deforestation in the Brazilian Amazon (Assunção 2013; Assunção et al. 2015). The country established new protected areas in the arc of deforestation. Perhaps most creatively, Brazil identified municipalities where deforestation was most acute and put them on a blacklist for receiving public finance and rural agricultural credit. This combination of enforcement, monitoring, and financial disincentives resulted in a more than 80 percent reduction in deforestation rates in the Amazon, all while agricultural production continued to increase. Recent trends, however, show that past successes can be undone by changes in political will. This topic is addressed in the next two chapters.

## CHAPTER 4:

# Why haven't these public measures sufficiently worked at scale yet?

Photo: Aaron Minnick/WRI

If forests provide so many benefits and if multiple measures have proved to be somewhat effective at conserving and restoring forests, then why haven't these measures sufficiently worked at scale yet? Why are deforestation and lack of large-scale restoration still an issue?

The short answer is that there are a series of market failures and governance failures—or, put another way, a series of economic and political economy barriers.<sup>15</sup> Building on insights in Seymour and Busch (2016) and Ding et al. (2017), we classify these into six failures (Table 2):

1. Forests too often are allocated for political gain ("patronage and power")
2. Forests conversion equates to economic gain ("worth more dead than alive")
3. Forest conservation and restoration can be hard to finance ("where's the money?")
4. Forest tenure is too often unclear or nonexistent ("who's the owner?")
5. Political management of forests is too often unaligned ("working at cross purposes")
6. Illegality or corruption is left unchecked ("laws on the books but not in practice").

This may not be an exhaustive list or categorizations and, of course, other classifications may be relevant. But the authors found that these six stood out in our review of the literature and our experience as elucidating what is standing in the way of adopting the measures identified in Chapter 3.

TABLE 2

## Which Barriers Affect Which Measures

Category	Measure	APPLIES TO		Relevant economy or political economy barrier
		Conservation	Restoration	
Reduce supply of land available for deforestation	1. Do not make public land available for conversion	X		Patronage and power Worth more dead than alive Working at cross purposes Laws on the books but not in practice
	2. Place moratoria on forest conversion	X		Patronage and power Worth more dead than alive Working at cross purposes
	3. Establish protected areas	X	X	Worth more dead than alive Working at cross purposes Who's the owner?
	4. Secure tenure and protect indigenous territories	X	X	Worth more dead than alive Who's the owner?
	5. Build climate-smart roads	X		Worth more dead than alive Where's the money? Working at cross purposes
Increase risk associated with deforestation	6. Enforce the law	X	X	Laws on the books but not in practice
	7. Develop conversion-free supply chains	X	X	Worth more dead than alive
	8. Improve transparency	X	X	Patronage and power
Reduce demand for alternative use of (once) forested land	9. Sustainably intensify agricultural production	X	X	Worth more dead than alive Where's the money? Who's the owner?
	10. Decrease agricultural commodity demand	X	X	Worth more dead than alive Where's the money? Who's the owner? Working at cross purposes
	11. Increase relative financial attractiveness of trees vs. no trees	X	X	Worth more dead than alive Where's the money? Who's the owner?
	12. Strengthen decentralized resource management	X	X	Who's the owner? Laws on the books but not in practice

Source: Authors.

## 1. Patronage and Power

### Forests too often allocated for political gain

Forests in many instances have been treated as a source of political patronage to be leveraged to garner and maintain political power and support. An extreme case is Liberia. Former President Charles Taylor routinely rewarded political loyalists with lucrative logging concessions. These concessions not only ensured political support but also enabled the purchase of arms to support the president's civil war effort and generated substantial private wealth for Taylor and his inner circle (McAlpine et al. 2006). During President Suharto's tenure in Indonesia, forest concessions were distributed to high-ranking military officers and political leaders in return for loyalty. Businessmen who were close to the president gained control over large areas of forestlands, and the appointment of party loyalists to agencies guaranteed utilization permits (Seymour and Busch 2016).

In other parts of the world, forests have also been treated as land banks for the rural poor, often under the guise of poverty alleviation and development programs. The distribution of forests to landless and other rural poor in India, for instance, was an important vote-garnering strategy throughout the 1950s and 1960s (Vira 1995). Successive governments, particularly in forest-rich central India, passively encouraged encroachments on forestland. Before elections, these encroachments would be regularized and titles distributed among occupants. The process was justified on the basis of improving rural economy and promoting food sufficiency. Each wave of settlement often led to more encroachments. It is estimated that between 1951 and 1972, more than 2.4 Mha of forests were converted to agriculture (FAO 1981).

## 2. Worth More Dead Than Alive

### Forest conversion equals economic gain

Forest conservation has historically been perceived as antithetical to dominant growth paradigms that enjoy a strong political constituency (Seymour and Busch 2016). Trees are too often considered to be standing in the way of economic growth models that are predicated on agriculture, extractive industries, and extensive transportation networks.

Development is seen as first extracting value from standing forests in the form of timber or biomass energy and then capturing the supposedly real longer-term value, which is the land under the trees, for agriculture (or the minerals under the land for mining) and speculation.

For many forest-rich tropical countries, production and trade in deforesting commodities like soy, palm oil, and beef drive rural employment and offer important export-linked revenue streams. In Indonesia, for example, although palm oil contributes between 1.5 and 2.5 percent of GDP, this generates more than \$18 billion in exports—equivalent to nearly 10 percent of Indonesia's total export value.<sup>16</sup> The oil palm sector is also critical for Indonesia's rural economy, employing nearly 6 million people.<sup>17</sup> Expansion of oil palm production is therefore often seen as an important poverty alleviation and growth strategy, despite its adverse environmental impacts. In other words, forest conservation and restoration is often outweighed by the political attractiveness of economic growth.

Part of the challenge is that many of the benefits of standing forests are invisible and dispersed (Seymour and Busch 2016). Many of the benefits described in Chapter 2 do not generate cash or returns that can be monetized and show up in a business profit and loss statement or a country's national accounts. This invisibility means that industries like agriculture and mining that do generate cash flows will typically outcompete forest conservation or restoration as a land use favored by politicians and land managers. Moreover, many of the benefits described in Chapter 2 accrue to a dispersed set of people, not just the owner of a tract of forest but also people downstream and downwind of the forest. The benefits of converting forests, however, tend to accrue to a concentrated set of people (e.g., the land owner, a company, certain government agencies). This disparity in concentration of benefit often translates into a disparity in strength of interest in the fate of a forest and willingness (and ability) to push the interests of dispersed beneficiaries vis-à-vis policymakers.

### 3. Where's the Money?

#### Forest conservation and restoration can be hard to finance

Forest conservation and restoration traditionally has proved difficult to finance for a handful of reasons.<sup>18</sup> First, most of the benefits of forest conservation and restoration are not monetized. Consequently, conventional financial analysis that focuses exclusively on monetized benefits often neglects to capture the full value that flows from forests. Therefore, such analysis estimates far lower returns for conservation and restoration than for actions that entail conversion of forests to an alternative use (or extraction of marketable resources from forests). This factor can make restoration and conservation financially unattractive investments and can impede the flow of funds to this sector.

Second, financial incentives supporting activities that drive deforestation or that keep trees from coming back often outweigh the incentives for conservation and restoration. Costa Rica (Chapter 3) was a case in point. Often these perverse incentives are justified on the grounds that they bolster poverty alleviation and rural development efforts targeted at small farmers. However, in many instances, subsidies are allocated per hectare of land ownership, which implies that large farmers derive most of the benefits. An analysis of U.S. Department of Agriculture statistics recently found that the top 3 percent of family farms in the United States (in terms of household wealth) received more than 30 percent of the agriculture subsidies and insurance indemnities (Bakst 2018). Furthermore, subsidies divert scarce resources from other, more effective poverty alleviation measures. A recent assessment found that while a million Indian Rupees (\$15,000) spent on power subsidies for the agriculture sector brings only 23 people out of poverty, the same amount invested in agricultural research and technology would bring 328 people out of poverty (Gulati et al. 2018). Large farmers and agribusiness are a powerful political lobby, and therefore perverse subsidies persist in many countries, much to the detriment of forests.

As a result, most of the finance currently available for forest conservation and restoration comes through public and philanthropic sources (Climate Policy Institute 2018). Yet these sources pale in comparison to the amount of financing potentially available from the private sector and

private financial institutions (Parker and Cranford 2010; Boucher 2015). Although private finance has been pivotal in the deployment of renewable energy solutions, its contribution to forests and land use has been nominal. The current lack of private investment in the forest sector can be attributed to various factors, including absence of a pipeline of investment-worthy projects, scalability and bankability of projects, high-risk perception associated with the long gestation periods of tree-based projects, insecure land and natural resource tenure, social conflict around land, and inadequate monitoring systems to track impact (Credit Suisse and McKinsey Center for Business and Environment 2016).

### 4. Who's the Owner?

#### Forest tenure is too often unclear or nonexistent

Communities living in and around forest areas should play a vital role in successful conservation and restoration, given the stake they have in forests. Too often, however, they are marginalized from decision-making about forests. A part of the problem lies in unclear and contested tenure. Today, indigenous peoples and local communities collectively occupy at least half the world's forests but have legally recognized rights for only about 10 percent of these lands (RRI 2015). The absence of secure legal rights leaves communities and their forests vulnerable. This vulnerability is exacerbated by increasing pressure on forests driven in the name of economic development, which often pitches indigenous peoples and local communities disadvantageously against politically connected, powerful actors. The spike in the killing of environmental defenders in recent years is evidence of this (Global Witness 2017). Furthermore, in some countries, land tenure is complex and messy with overlapping claims among governments, corporations, and communities. In Indonesia for example, it has been difficult to operationalize political will to recognize indigenous rights due to the multiplicity of incongruent maps held by different agencies that give rise to overlapping legal claims on land.<sup>19</sup> Contestation and conflict also exist within communities, between adjacent communities, indigenous and migrant communities, and legitimate claimants and fake claimants. In the absence of robust conflict resolution mechanisms, these conflicts can persist for decades, leading to suboptimal land and forest outcomes.

Insecure tenure also dampens motivation for restoration because communities may be unsure of benefitting from the results of their labor in restoring forests. Unclear tenure also intensifies investment risks and adversely affects the flow of funds into these forest areas (Ding et al. 2017).

Indigenous and community rights to land and resources have been embodied in international law.<sup>20</sup> An increasing number of countries are enacting legislation to codify these rights in law, although the pace of recognition has slowed down since 2008 (RRI 2018). However, these rights are not always implemented. India's Forest Rights Act, for instance, provides legal recognition of individual and collective forest rights.<sup>21</sup> Estimates suggest that more than 30 Mha of India's forests are eligible for recognition of community rights under this law, yet legal rights have been recognized in only about 3 percent of this eligible area (Agarwal and Saxena 2018).

A mix of constituencies opposes tenure reform. Political will for reform can be weak in part because strong rights diminish the authority of politicians and bureaucrats to convert forests for development and thus weaken patronage networks. Further, clarifying overlapping tenure can often be messy and pose a political conundrum through the creation of winners and losers. Corporate interests focused on exploiting land and forests benefit from weak tenure because it creates opportunities for easier access. Even some in the conservation community have opposed recognition of tenure in natural forests, preferring instead to have inviolate enclosures designed to keep people out of forests.

## 5. Working at Cross Purposes

### **Political management of forests is too often unaligned**

In some cases, governance over land that affects forests is not aligned, leading to policy paralysis, incoherence, or even conflict. The governance of forests is often influenced by multiple agencies, operating at different levels, leading to horizontal and vertical fragmentation of interests, priorities and actions. In India, for instance, the mandate for forest conservation and restoration, tenure and land rights, agroforestry, extractive industries, power, and decentralized governance at the national level are all distributed among

different ministries. The Ministry of Rural Development has de facto emerged as one of the largest financiers of forestry through its Mahatma Gandhi Rural Employment Guarantee Scheme (World Resources Institute 2018). And since the 1990s, the Supreme Court of India has become actively involved in forest conservation and has, in many ways, crafted an executive role for itself in the sector, (Rosencranz and Lele 2008). Each of these agencies, has its own mandate, policies, implementation modalities, and monitoring frameworks. Many times, interests of these agencies are in conflict with each other. Thus, for more than 10 years, the conservation-focused Ministry of Environment, Forests and Climate Change has been at loggerheads with the rights-focused Ministry of Tribal Affairs, contributing to poor implementation of the Forest Rights Act. This fragmentation has bred incoherence in policy and action, thus undermining conservation and restoration efforts.

The challenges of fragmentation can be exacerbated in federal systems where responsibility for forests is distributed among national, provincial, and local levels (Lele et al. 2013). An estimated 80 percent of the world's forests are in countries with federal systems of government where powers to take decisions and powers to implement those decisions are split between two levels of government: national and state or provincial governments. This can lead to tensions when the agencies have divergent and sometimes conflicting priorities and interests, such as when a national forest ministry aims to conserve forest area while a state-level agency seeks to create local jobs in extractive industries. Furthermore, in federal systems, the institutions of legislatures, executive branches, and the judiciary is replicated in every state. This can increase the structural complexity of building synergistic action (Chaturvedi 2016).

## 6. Laws on the Books but Not in Practice

### **Illegality and corruption are left unchecked**

Many of these barriers are underpinned or exacerbated by systemic corruption and low levels of law enforcement. As a result, although progressive laws may be on the books, laws that otherwise would support forest conservation and restoration, there is little follow-through; and illegalities continue to occur. Enforcement of the Brazilian Forest Code, for instance, has

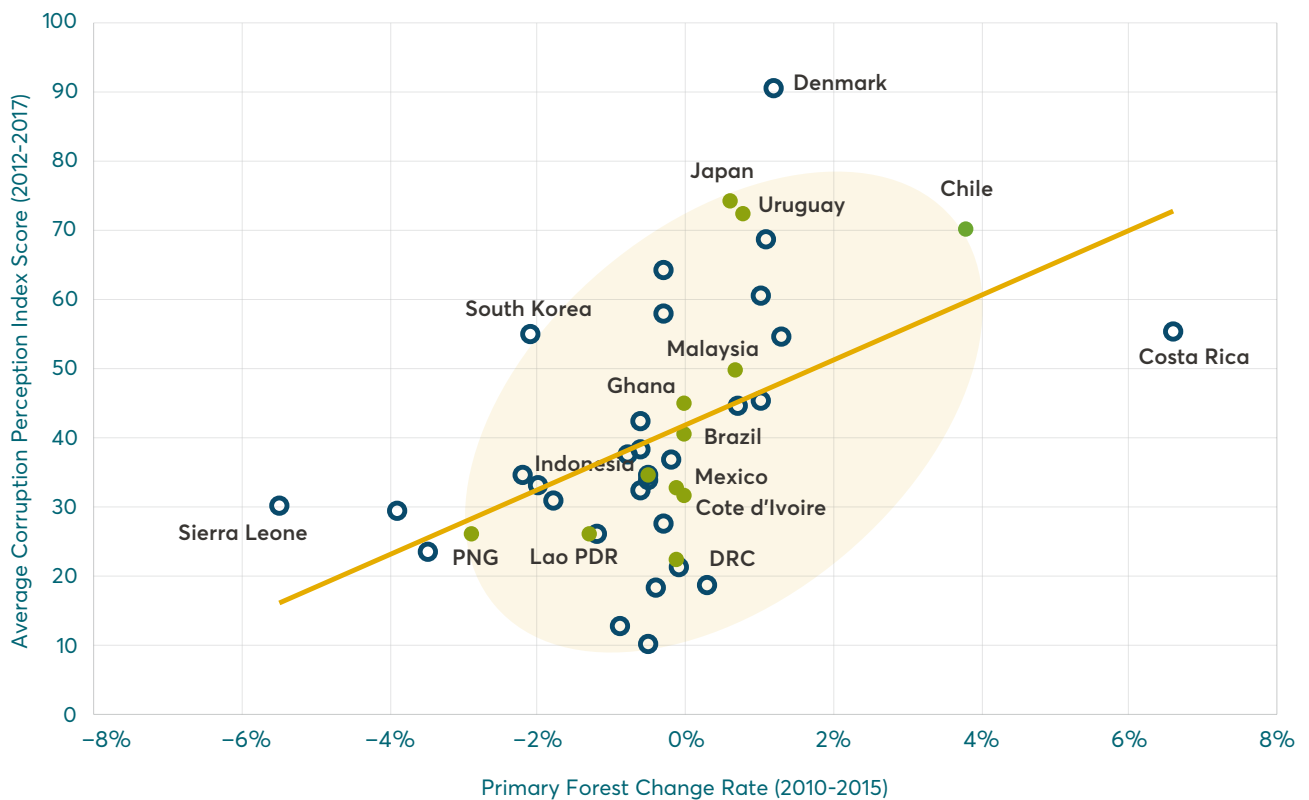


waxed and waned through the years. Illegal logging and mining remain rampant in numerous frontier forest regions such as Peru, Colombia, the Guyana Shield, and elsewhere (DuPée 2019; UNODC and Government of Colombia 2018; Weisse and Goldman 2019). In numerous countries, the process for winning a concession to extract resources from a forest is opaque. In Lao PDR, multi-layered, complex processes for issuing logging licenses, ostensibly designed to provide oversight and reduce illegality, are used by officials for rent seeking. Estimates suggest that nearly 40 to 45 percent of costs incurred by logging companies are for “facilitation fees” paid to officials at multiple levels who help navigate the licensing processes (Baird 2010).

Empirical evidence suggests a link between systemic corruption (not limited to the forest sector) and forest loss and degradation. In a comparison of corruption scores of a number of nations and changes in their primary forest cover between 2010 and 2015, the New York Declaration on Forests Assessment Partners found that countries with high perceived levels of corruption also experienced high forest loss (Figure 7). In a further analysis of 100 countries, the Partners found that there had been negligible reduction in corruption in rural areas in the past 10 years (NYDF Assessment Partners 2018).

FIGURE 7

## Perceived Corruption and Rate of Primary Forest Cover Change for 42 Countries



Notes: Scores are on a scale of 0 to 100, from most to least corrupt. Transparency International's Corruption Perceptions Index ranks countries by their perceived level of corruption based on surveys and expert assessments and is not limited to the forestry sector. PNG = Papua New Guinea; Lao PDR = Lao People's Democratic Republic; DRC = Democratic Republic of Congo.

Source: Climate Focus analysis based on data from FAO Forest Resources Assessment 2015 (2010–15 data) and Transparency International's Corruption Perceptions Index (2012–17 data).

## CHAPTER 5:

# How can one overcome these economic and political economy barriers?



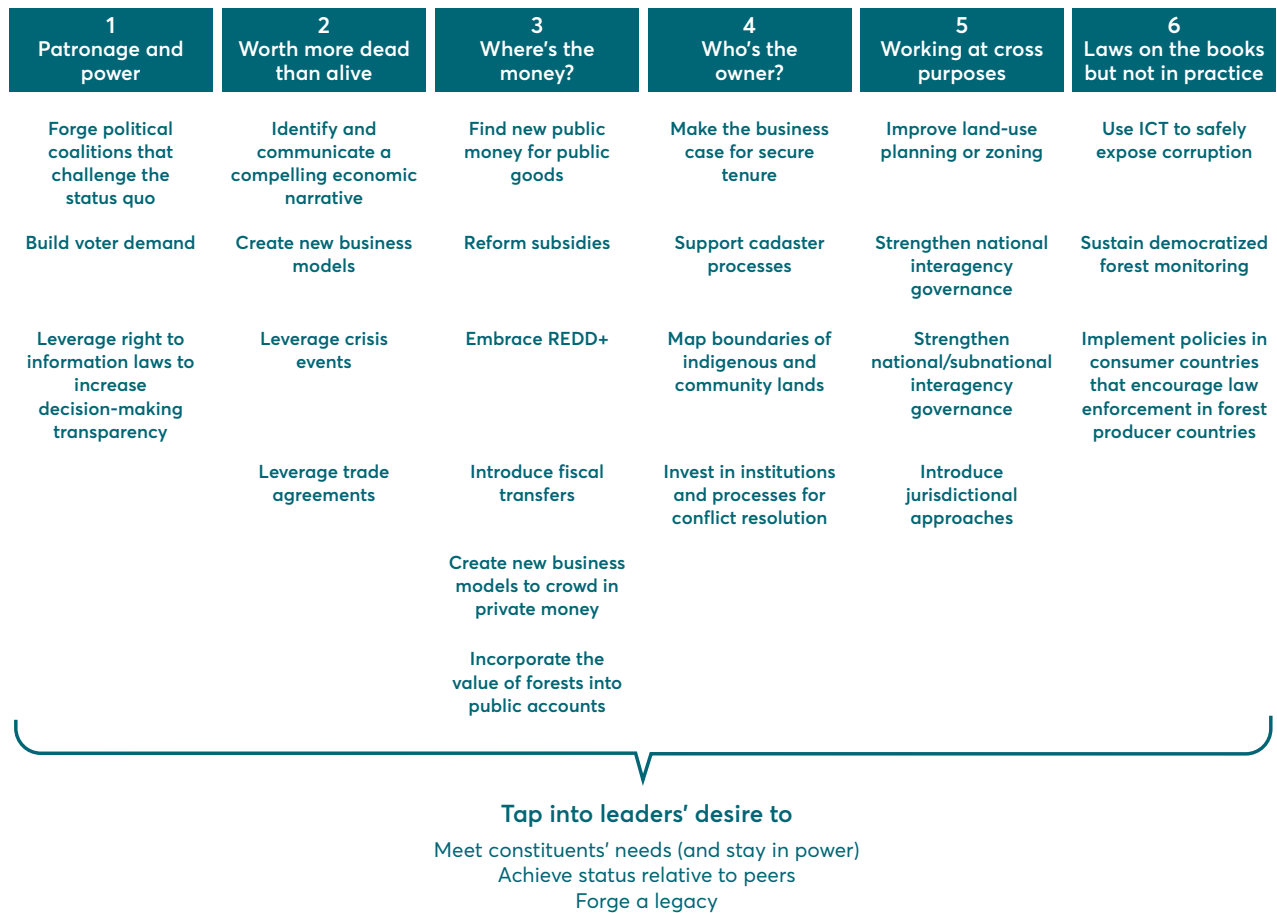
Photo: Aaron Minnick/WRI

Accelerating and scaling public-sector support for forest conservation and restoration will require that these economic and political economy barriers be overcome. In Figure 8, we suggest a number of strategies or tactics for addressing each of these barriers. This list is not meant to be exhaustive. Some of the strategies could address more than one barrier. We conclude with several tactics that address many

of the barriers. It should be noted that the six barriers discussed in Chapter 4 are embedded in larger political, economic, and social contexts that are beyond the scope of this paper to describe and address. Interventions to address these barriers need be tailored to the ability of various actors to take action and, where key actors are constrained, target the underlying factors sustaining the status quo.

FIGURE 8

## Tactics for Overcoming Economic and Political Economy Barriers



Source: Authors.

### 1. Overcoming Patronage and Power

Overcoming this barrier entails developing political pressure that dissuades public-sector leaders from handing away forests (or undermining efforts to conserve or restore forests) as a means of garnering and maintaining political power and support. Here are some examples:

- **Forge political coalitions that challenge the status quo.** Many of the policies that undermine forest conservation and restoration are in place because of one or more powerful political coalitions that benefit from the *status quo*. Because politics is the art of power, it often takes a different political coalition to exert even greater power to counter the ruling one. Forging such

coalitions is therefore critical. Importantly, they need to include stakeholders that have the ear of political leaders and get beyond the “usual suspects” of environmentalists and human rights advocates by including progressive businesses, financial or insurance institutions, national security interests, and others. The recent formation of the Cities4Forests initiative is an example, designed to bring the voice of urban residents and governments (which in many countries comprise more than half the population) to speak up in favor of forest conservation and restoration (because they see it in their urban self-interest). Of course, which coalition is sufficient will vary by country and situation, so we cannot define an optimal one here.

- **Build voter demand.** Political decisions in democracies, in theory at least, are supposed to reflect the will of the majority. Votes matter, as can be seen by recent elections in some countries where the presidential or prime minister election has led to tectonic shifts in a whole range of policies that affect forests. A sufficient number of domestic voters, therefore, need to start demanding forest conservation and restoration. The issue cannot be seen as a special interest of a small group of elites. As evidence, it is no surprise that the period of greatest advancement in environmental policy in U.S. history was the late 1960s and early 1970s when concerns about environmental quality were high on the political agenda, in the media, and expressed even by street demonstrations—so much so that the Clean Air Act and other landmark legislation passed by large majorities in both houses of Congress and were signed by President Nixon.<sup>22</sup> Albeit not easy and a lot of work, energizing voters via grassroots activism, social media, and other modern forms of political mobilization should not be overlooked.
- **Leverage right-to-information laws to increase decision-making transparency.** Deforestation and forest degradation can thrive in the shadows of patronage networks where decision-making is highly centralized and insulated from scrutiny. Enhancing the transparency of decision-making processes can increase the risks of exposure and therefore challenge the prevalence of patronage networks. With the increasing adoption of “right-to-information” legislation, today citizens of more than 120 countries can demand erstwhile sensitive information on not only what decisions are being taken but also by whom and on what basis (Banisar 2018). To be effective, however, there must be greater awareness of this right to Information, as well as a clearer understanding among citizens of the processes through which access to information can be gained.

## 2. Overcoming “Worth More Dead than Alive”

Overcoming this barrier entails demonstrating to the powers that be (e.g., in governments, in private-sector firms) that conserved or restored

forests result in more positive political, business, and human well-being outcomes than the status quo. Here are some examples on how to do this:

- **Identify and communicate a compelling economic narrative.** Decision-makers need to hear and understand an alternative yet credible narrative on how economic development can be achieved in part via conserving and restoring forests. Some studies exist that show how the economic and financial impacts of forest conservation and restoration can lead to better financial returns and GDP growth than business-as-usual growth models. One example is a recent detailed analysis by Overman et al. (2019) which showed that the Guyana government has more to gain from payments for the climate benefits of its forests than from timber and gold extraction. And while economic gains from extractives would have been concentrated in a few private interests, the alternative development path would accrue financial benefits for the government and its national development priorities. More of these types of narratives are needed, more should articulate how conservation or restoration can benefit jobs, and more need to be communicated by persuasive messengers. The New Climate Economy initiative developed such a narrative for wider economic development and actions to combat climate change, and it recruited persuasive business and political messengers. The same needs to occur when it comes to forests.
- **Create new business models.** Business models where landowners or land managers earn a decent financial return from having trees on their land can help make forests worth more alive than dead (Faruqi et al. 2017), yet often will need supporting public policies. For instance, putting a price on carbon or creating a payment for the watershed protection benefits forests provide would generate revenue streams for forests that are currently missing. Markets for certified, sustainable timber can result in forests being valued staying as forest. See “Business of Planting Trees” by Faruqi et al. (2017) and “Prosperous Forests” (Flynn et al. 2019) for an exploration of a number of such possible business models.

- **Leverage crisis events.** Events where the absence of trees leads to some human crisis highlight the economic and other values that forests would otherwise provide. Governments, civil society, and the media can leverage these events to build political and public support—sometimes nearly overnight—for forest conservation and/or restoration. Of course, one does not desire these events to occur. But when they do, these actors should act quickly to mobilize public and private-sector support for conservation and restoration. History suggests that leveraging crisis events can be one of the most powerful means of breaking through old political economies (Box 1). It often takes the proverbial 11th hour before people change their behavior.
- **Leverage trade agreements.** Governments care about trade agreements, given the promise of economic growth they offer to the nation. Finding a way to link forest conservation (or restoration) to trade agreements therefore could be a means by which one can make forests worth more alive than dead. In essence, this effort changes a nation's economic calculus so that government decision-makers link some of the economic benefits to be achieved via the trade deal with the status of the nation's forests. This calculus can be quite powerful. For example, threats by selected European Union member states to not approve the MERCOSUR trade agreement with Brazil may have played a role in the Brazilian government finally starting to crack down on widespread fires in the Amazon during 2019 (Samuel 2019).

## BOX 1

### Leveraging Crisis Events

One way to break through political economy barriers is to leverage crisis situations. Crisis events caused, at least in part, by the lack of trees highlight the value of trees. To the degree that the presence of trees would have avoided or ameliorated a catastrophic event, crises can make it clear that trees are worth more alive than dead. Crises can change political and economic dynamics and can even compel public and private-sector actors to overcome prevailing vested interests. In short, crisis events can build the somewhat elusive political will to act. That said, it is important ensure that such a response does not blame and further marginalize the victims.

Crisis events can include floods, landslides, droughts, sandstorms, wood shortages, declining crop yields, and unemployment. They include humanitarian catastrophes where damage could have been avoided if forest landscapes had been healthy (e.g., landslides), where avoiding deforestation or degradation could circumvent catastrophic damages (e.g., fires), where the act of restoration mitigates the crisis (e.g., unemployment), or where restoration prevents future crises (e.g., floods).

History has numerous examples of such crises overcoming political economy barriers to action. A century ago, concern about a timber shortage prodded the U.S. government to form the U.S. Forest Service and create a network of national forests (Hansen et al. 2010). The infamous black wind of 1993 that brought heavy amounts of sand and soil into Beijing galvanized political will to invest in restoration in the Loess Plateau (Qian et al. 2002). More recently, the forest and peat fires of 2015 (which received wide media coverage and had significant economic impacts) played a role in convincing and catalyzing the Indonesian national government to implement moratoria on conversion of forests and peat (Austin et al. 2014; Wijaya et al. 2017).

### 3. Overcoming "Where's the Money?"

Overcoming this barrier requires making the case for financing forest conservation and/or restoration and finding sources of financing for which forest conservation and/or restoration earns a return sufficient to meet the investor's (whether that be a community, a business, or a government) need. Doing so has the potential to shift the decision calculus toward sustaining trees as opposed to clearing them or preventing them from returning. Of course, securing more funds for forest conservation and restoration is made easier as the aforesaid barriers are overcome. Here are some examples on how to do this:

- **Find new public money for public goods.** As Chapter 2 shows, forests provide a number of public goods, such as improved water supply, disaster risk reduction, climate stabilization, and biodiversity conservation. As the representative and defender of the public interest, governments therefore should be willing to finance the conservation and restoration of forests. This includes funding from domestic government coffers for domestic forests (e.g., local or regional or national payments for ecosystem services), as well as funding from international development assistance or climate finance to support forests in foreign countries.
- **Reform subsidies.** While generating new sources of public funding for forest conservation and restoration is surely needed, redirecting existing sources of public funding away from activities that keep trees off land to activities that put or keep trees on land is another means of overcoming the finance hurdle. The agricultural subsidy, common in most countries, is the top candidate for such redirection. In some of the world's largest agricultural producing countries, agricultural subsidies dwarf many other potential sources of finance that affect land use. Globally, of the approximately \$600 billion<sup>23</sup> in agricultural subsidies spent per year, about \$300 billion of this is direct expenditures and tax credits to farmers. The rest are market price supports, which are harder to redirect to forest conservation or restoration practices (Searchinger et al. 2018). The European Union has taken steps over the past decade to start shifting some

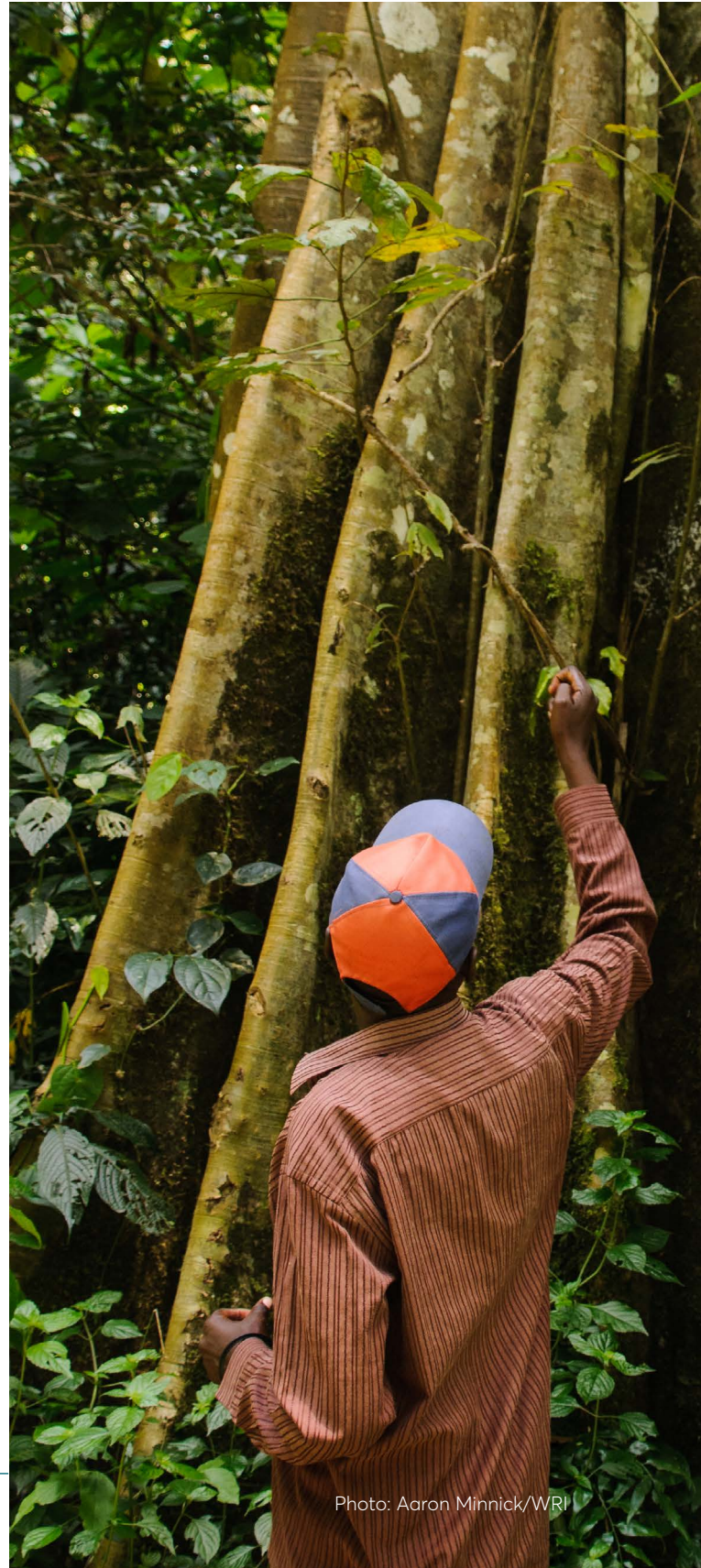
of the Common Agricultural Policy subsidies to more sustainable land management practices. Much more there and worldwide needs to be done. This is a huge, albeit relatively untapped, opportunity. But doing so will require forging new political coalitions of actors to overcome entrenched interests in the status quo.

- **Embrace REDD+.** REDD+ is arguably the biggest financing opportunity for forests that hasn't yet been fully tried. A few countries, such as Norway, Germany, and the United Kingdom, have been pioneers in supporting REDD+ and pay-for-performance related to REDD+. However, more countries and more funding need to embrace REDD+ and engage forest-rich tropical countries. REDD+ engagement should be of highest quality, following guidance being developed by the Architecture for REDD+ Transactions and supporting jurisdictional approaches, not project-based programs. Support for REDD+ may be bolstered by emerging evidence that the cost of REDD+ is likely to be less than is often forecast by analyses based on marginal abatement cost curves (Box 2).
- **Introduce fiscal transfers.** Another candidate source of redirected existing funding is the fiscal transfer. In some countries with federal forms of government, the national government transfers funds from its national coffers to states or provinces to encourage specific behaviors or to compensate them for some forgone development or inequity in development. Increasing the degree to which the fiscal transfer is linked to the amount of forest the state or province conserves or restores could help tip the subnational political calculus in favor of having more forests. Brazil has been a pioneer in using fiscal transfers to support conservation. Ecological fiscal transfers in Brazil, called ICMS-Ecológico or ICMS-E, have redistributed a portion of the revenues of state-level value-added tax to local governments on the basis of ecological indicators (Cameron 2016). In 2015, India changed its fiscal transfer formula so that 7.5 percentage points are linked to the amount of the state's forest cover. This implies that between 2015 and 2020, an estimated \$7–12 billion will flow to the states annually,

depending on the area under dense forest and tree cover in 2013 (Busch and Mukherjee 2018). If India's pioneering effort proves to encourage states to increase their forest cover so that they get more funds in the next fiscal transfer cycle, then other countries may want to follow suit.

- **Create new business models (to crowd in private money).** As described earlier, business models where landowners or land managers earn a decent financial return from having trees on their land can help increase the amount of private-sector (e.g., businesses, private-sector banks) financial flows to forests. The publication, "Prosperous Forests" (Flynn et al. 2019), delves into a number of such possible business models. In Brazil, business models explored by the VERENA effort also showed that reforestation with native species for economic use and agroforestry systems can provide a risk-adjusted return equivalent to forestry plantations and agriculture monocultures (Batista et al. 2017). Finding ways to reduce financial risks (e.g., first loss guarantees) will be important if private investment in forest conservation and restoration is to be attracted. Likewise, supportive public policies may be needed to ensure that a business case exists for the private sector.
- **Incorporate the value of forests into public accounts.** In some circumstances, quantifying the economic value of the suite of ecosystem services that forests provide beyond timber (see Chapter 2) could increase appreciation among decision-makers of the benefits of forests, and perhaps their willingness to invest in them. For example, California passed AB2480 in 2016, which recognizes forested watersheds and other natural systems as a critical component of California's water infrastructure, just like reservoirs, aqueducts, and treatment plants. AB 2480 established that the restoration and management of these watersheds are eligible for the same forms of funding and finance as other water delivery and filtration infrastructure (State of California 2016; Pacific Forest Trust 2017). In addition, interpretation of the Governmental Accounting Standards Board (GASB 62)—which sets accounting rules for state and

local governments throughout the United States—is that government agencies can move investments in natural infrastructure (such as forest conservation and restoration) to the balance sheet (GASB 2010). This in turn allows for municipal debt financing for natural infrastructure, a funding typically eligible for traditional "grey" capital projects (Harrington 2018, GASB 2018).



## Estimating the Cost of Reducing Deforestation

REDD+ is the framework negotiated under the UNFCCC for international cooperation in reducing emissions from forest degradation and enhancing carbon removals from forests. Performance-based finance is the unique feature of REDD+ that distinguishes it from prior efforts to slow deforestation. While REDD+ initiatives have progressed more slowly than initially anticipated, dozens of countries have invested in REDD+ readiness activities, and a first generation of performance-based agreements and transactions has begun to graduate from the pipelines of multilateral finance institutions like the FCPF Carbon Fund and the Green Climate Fund. In addition, potential new sources of finance, including forest carbon credits to offset emissions from international aviation and other hard-to-abate sectors, have appeared on the horizon.

Some observers have discounted the potential of REDD+ finance to stem stubbornly high rates of tropical deforestation, arguing that even new sources of market-based funding will not be enough to provide sufficient incentives to compensate for the loss of revenues from other land uses, especially the production of globally traded commodities. Donor countries are more likely to commit to REDD+ partnerships and include forest carbon credits in compliance markets to reduce emissions if the amounts required are predictable and represent a common understanding of the economic costs and benefits that forest countries face. Thus, estimating the likely cost of REDD+ is important to get right.

In the early days of discussions over the idea that became REDD+, the mental models behind cost estimates were those of individual producers selling forest carbon credits into a global market. Analyses focused on the cost of compensating each land user for the opportunity cost of not converting the forest to another use, producing marginal abatement cost curves. These analyses produced a range of estimates of the amount of forest emissions that could be averted at various prices per ton. A more recent and conservative version of such analysis (Busch and Engelmann 2015) estimated that a \$20 per ton price on forest carbon would avoid about one-quarter of anticipated emissions from deforestation between 2016 and 2050.

However, REDD+ as ultimately negotiated under the UNFCCC is based on accounting and finance at the national scale, with participation at the level of subnational jurisdictions as an interim measure. In other words, the globally agreed REDD+ system now recognizes its goal as making maintaining forests more attractive to those with the political power to change the trajectory of deforestation at large geographic scales: governments and policymakers, not individual landowners. And policymakers face a very different set of costs and benefits than individuals.

For example, much current deforestation is illegal, taking place within already established protected areas. The cost to governments of maintaining such forests is the cost of law enforcement rather than the forgone cost of economic revenues from alternative land uses. Fogliano de Souza Cunha et al. (2014) estimated that Brazil's out-of-pocket costs of dramatically reducing deforestation in the Amazon in the years following 2004 amounted to only a few dollars per ton of avoided emissions. Furthermore, demand-side pressures from commodity purchasers could provide additional incentives for producers and producer countries to ensure that their products are deforestation-free.

On the benefit side, forest-rich countries are increasingly recognizing the domestic social and economic value of the noncarbon ecosystem services provided by forests, including water cycling, pollination, and local climate resilience and adaptation. In the aftermath of Indonesia's catastrophic fires in 2015, which imposed \$16 billion in losses to the economy and severe respiratory distress on its residents, the government of Indonesia strengthened regulations to protect peatland forests as a public safety measure.



In the absence of a global market for jurisdictional-scale forest carbon credits, the first generation of REDD+ performance-based transactions has used a negotiated price per ton of avoided emissions—\$5—that was effectively set by donor countries and accepted by forest countries. In the long run, the level of REDD+ incentives needed by developing countries to reduce deforestation will be revealed by the prices that they are willing to accept to reward their performance.

In the meantime, a new analytical basis for understanding the cost of REDD+ is urgently needed to address the evolution in REDD+ toward larger implementation scales and government decision-making. In light of the different costs and benefits faced by governments rather than individual land users, lower levels of total international REDD+ finance are likely required to achieve any specific deforestation reduction target than would be predicted by an earlier generation of models.

#### 4. Overcoming “Who’s the Owner?”

Overcoming this political economy barrier involves approaches that clarify and secure tenure of individual landowners, communities, and indigenous peoples. Here are some examples:

- **Make the business case for secure tenure.** The recognition of indigenous and community rights is often opposed by political and business interests who are concerned that secure tenure by others will diminish prospects for infrastructure and industrial projects. However, unclear tenure and the resulting contestation over resource rights often underpins conflicts that can have severe economic, legal, and public relation repercussions on development activity. Putting the spotlight on the latter has the potential to galvanize support by political and private-sector elites for clarifying tenure. Land Conflict Watch, for instance, verifies and aggregates reports of land conflicts in India and traces their impact on investments as well as on people. Recent estimates suggest that 686 instances of conflicts in India have affected more than \$200 billion in investment.<sup>24</sup>
- **Support cadaster processes.** One step for clarifying forest and, more widely, land tenure is to create a cadaster: a register of property showing the extent and ownership or control over land, including community lands and common lands. Typically created to support taxation programs, cadasters also can be a foundation for distribution of government subsidies, farmer loans, and law enforcement when it comes to forest conservation and restoration. As such, cadasters are foundational to a lot of the recommendations in this paper. Ideally, cadasters should be digitized, map-based, and publicly available—at least the boundaries and who has claim to what. Over the past decade, Brazil has been developing its first cadaster to cover the entire country. Indonesia’s One Map process is roughly the equivalent. Both need full follow-through, and more forest-rich nations that lack proper, public cadasters need to develop them.
- **Map boundaries of indigenous and community lands.** Although this is a subset of the activity to support cadaster processes, a special effort is needed to map and secure indigenous and community land boundaries because of the forest protection benefits of indigenous and community lands. In a situation of competing claims to land, indigenous people and local communities are often at a disadvantage since there is little documented and aggregated knowledge on where their lands are located. By mapping their territories and creating a credible repository of information on these lands, indigenous peoples and communities can be empowered to legally prove their rightful claim to land and to contest attempts by political and corporate elites to appropriate indigenous territories. Using a participatory approach, Google Earth’s Outreach Program recently systematically mapped indigenous territories in Brazil and Canada. These boundaries have been integrated with

Google Maps and Google Earth, alongside other types of information, to publicize the extent of indigenous lands in these countries as well as provide evidence of the contribution of these lands in supporting biodiversity and climate outcomes.

- **Invest in institutions and processes for conflict resolution.** While mapping indigenous and community land claims is an important input, it is only the first step in situations where there are competing claims to land. Boundaries of overlapping land claims and concessions need to be worked out among land owners, communities, and government agencies. This calls for transparent and fair processes, trusted institutions, skilled facilitators, and time. Indonesia's One Map process is an example of such an approach.

## 5. Overcoming "Working at Cross Purposes"

Overcoming this political economy barrier involves creating governance approaches or bodies that align management of forests across the myriad agencies that affect them:

- **Improve land-use planning or zoning.** One way to clarify and align governance of forests and other lands is to have a clear, mutually agreed upon land-use plan. Jurisdictions need to clarify which lands can be used for what purposes and identify who will manage these lands. Because different land uses generate benefit streams for different stakeholders and thereby create winners and losers, land-use plans must build in or be supplemented by measures for equity (Lele et al. 2013). One way of doing this is by designing land-use planning processes that are participatory and inclusive. A good land-use plan should designate areas for conservation (protected areas) and recognize community and indigenous lands, while also clarifying which forestlands are allowed to be managed for production or converted to other land uses.
- **Strengthen national interagency governance (horizontal).** One way to increase alignment of objectives and management of forests at the national level is to create a body, either permanent or temporary, that brings together relevant government agencies or ministries whose independent decisions affect forests. In this manner, conflicting

interests can be aired, and a forum exists for attempting to resolve them. Likewise, the forum increases the likelihood of collaboration when it comes to implementing policies. Colombia, for instance, has created an Inter-Institutional Restoration Roundtable tasked with ensuring the country meets its Initiative 20x20, Bonn Challenge, and NDC commitment of getting 1 Mha of degraded land into the process of restoration. This roundtable includes representatives from the Ministry of Environment, Ministry of Agriculture, Ministry of Mines and Energy, and Ministry of Transportation. The National Planning Department and agricultural associations also participate. The roundtable is chaired by the Inter-American Institute for Cooperation in Agriculture. Thus far, this body has been able to keep restoration on the political agenda (even during the transition to a new president from a different political party) and has facilitated cross-sectoral efforts to boost restoration efforts (Vergara personal communication 2019).

- **Strengthen national and subnational interagency governance (vertical).** Another way to increase alignment of objectives and management of forests is to create bodies or processes that bring together relevant government agencies at the national and subnational levels. In the United States, for example, the federal U.S. Forest Service (USFS) and state forest agencies, typically departments of natural resources, collaborate extensively on forest management. The USFS has a State and Private Forestry Office that is dedicated to collaborating with state and local governments and with the private forest industry on management of forests outside of federal ownership. This collaboration also happens through 10 regional offices, which are closer to the states and the unique issues they face. The 2008 U.S. Farm Bill also tasked states and territories with developing forest action plans.<sup>25</sup> These plans assess the condition of forests and trees within their boundaries, regardless of ownership, and develop strategies to conserve them and enhance public benefits. Every state now has a forest action plan.
- **Introduce jurisdictional approaches (diagonal).** A potentially potent way of implementing many of the measures

recommended in this publication is to do them at the jurisdictional scale. The so-called jurisdictional approach refers to a comprehensive approach to land-use governance, decision-making, and zoning across a legally defined jurisdiction (e.g., state, district) or territory (Nepstad et al. 2013; Stickler et al. 2013). Part of the theory of change is that the jurisdictions that succeed in implementing these measures, and thus succeed in decoupling agriculture from ecosystem conversion, would start to receive preferential investment by companies and financial institutions. For example, they would become considered low risk for companies wanting to source agricultural commodities in conformance with their deforestation-free supply chain commitments. They would be considered safe places to invest for international financiers and domestic agricultural lenders. A hope is that other jurisdictions would witness these benefits and start to shift themselves. Examples are beginning to emerge. Launched at the COP 21 climate conference in Paris in 2015, the Brazilian state of Mato Grosso’s “Produce, Conserve, and Include” strategy and plan aim to promote sustainable agriculture, eliminate illegal deforestation, and reduce greenhouse emissions, all at the same time. Responding to concerns about losing access to international soybean markets, the strategy and plan have 21 performance targets and involve 40 partner organizations. Currently, deforestation remains relatively low while the agriculture sector, led by soybeans, thrives (Boyd et al. 2018).

## 6. Overcoming “Laws on the Books but Not in Practice”

Overcoming this political economy barrier entails implementing any of a suite of tactics recommended in the literature for reducing corruption, increasing transparency, and improving law enforcement more widely in a society, not just as corruption and law enforcement relate to forests. Such tactics include ensuring an empowered independent judiciary, a free press, well-resourced law enforcement, and more (Brock 2018). When it comes specifically to forest conservation and restoration, we highlight three tactics that may be particularly relevant:

- **Use ICT to safely expose corruption.** Corruption is for the most part a hidden malaise that is difficult to trace and therefore challenging to tackle. Exposing corruption is often accompanied by substantial risks of retribution, implying that it often goes unreported. Modern ICT can help overcome this. Web-based applications such as IPaidABribe crowd-source information of everyday experiences of bribery and corruption, anonymize incident reports, and then direct these reports to media as well as to trusted government officials. By maintaining anonymity and promoting collective action, IPaidABribe has reported more than 180,200 instances of bribes across more than 1,000 cities of India alone. In many cases, the data collected by IPaidABribe have become the basis of action taken against corrupt officials.<sup>26</sup>
- **Sustain democratized forest monitoring.** Information is truly power. For many years, data on forests were singularly the domain of governments, and they typically controlled and limited who had access to those data. But with the advent of free, open-access systems like Global Forest Watch, data about forests—including where they are, what is happening to them, and who is affecting them—are now literally at the fingertips of everyday citizens, forest-dependent people, the media, nongovernmental organizations, and more. Armed with this information, people can call out illegalities that governments either do not see or do not prosecute. For example, it was a journalist who noticed a clearing in a protected tropical rainforest in Peru and then identified it as being caused by a cocoa company that was listed on the FTSE stock exchange for Good. Publicity about the finding led to the cessation of forest clearing and the delisting of the company from the FTSE stock exchange (Payne and Alix Mann 2015).
- **Implement policies in consumer countries that encourage law enforcement in forest producer countries.** Over the past decade, several of the world’s largest importers of wood and other forest commodities have put in place regulations that make it illegal to import and trade wood and other forest products that were harvested illegally in the country of origin. These laws include the

2008 amendments to the Lacey Act in the United States, the EU Timber Regulation, and Australia's Timber Rule. The intent of these laws is to send a signal to forest-rich countries to crack down on illegalities in the forest sector within their borders in order to sustain or obtain preferred access to lucrative export markets. A number of actions have already occurred due to these laws (e.g., involving trade of rosewood and mahogany from places like Madagascar and Peru). But for such laws to maximize their potential, the existing laws need to be more aggressively enforced, and other major forest commodity importing countries like China and India need to pass and enforce similar laws. Otherwise, the export of illegally produced forest commodity will leak to those uncovered markets.

## CONCLUDING CONSIDERATIONS

When considering approaches to increase public-sector support and investment (in the broadest sense of the term) in forest conservation and restoration, one should think about what drives public decision-making. What do public sector decision-makers—presidents, governors, and agency leaders—care about? What ultimately motivates them, as individuals, to make certain decisions? Grindle and Thomas (1992) and others have delved into this question. Looking across the literature and our own experiences working with public-sector leaders, we hone in on three, among the myriad, things that seem to personally motivate decision-makers: meeting constituent needs, achieving status relative to peers, and forging a legacy.

Democratically elected political leaders ultimately want to meet their constituents' needs, which, among other things, helps them stay in power. This means winning votes, securing the support of powerful political coalitions, ensuring government financial solvency, enabling economic growth and development, and avoiding or solving crises, among other things. Several of the approaches described earlier, especially those overcoming political economy barriers numbers 1, 2, and 3, are designed to help enable this while advancing forest conservation and restoration. In jurisdictions where political

leaders are less accountable to their constituents, strategies and tactics need to focus on strengthening accountability measures and recognize the potential for external interventions to inadvertently exacerbate power imbalances.

In terms of status, decision-makers often are concerned about how they or their jurisdictions are performing relative to peers. Publicly ranking nations, states, or provinces relative to each other in terms of deforestation rates, reforestation rates, total tree cover, or other metrics is a potentially influential approach to trigger such personal concerns of status relative to peers. Another approach is to launch platforms or coalitions where jurisdictions (e.g., nations) publicly sign up or join to commit to forest conservation and/or restoration and ultimately follow through. Examples include the Governors' Task Force on Climate and Forests (conservation) and the AFR100 (restoration). Being part of such coalitions creates an environment in which leaders seek to keep up with peers, not miss out on new developments, and/or obtain public recognition for their commitments and actions. At the same time, it is important not to humiliate or condescend to leaders, which could trigger them to turn against forest conservation and restoration or inflame nationalist sentiments.

In terms of legacy, decision-makers often want to make a lasting mark on the history of the jurisdictions they lead. A case in point is recent Colombian President Santos, who on more than one occasion proudly announced that the country had dramatically increased the amount of land designated as protected area during his tenure. Theodore Roosevelt sought and attained such a legacy in the United States more than 100 years ago.

Appeal to meeting constituent needs. Appeal to status. Appeal to legacy. These motivators of human behavior are too often overlooked in favor of more technical approaches. But they are fundamental to what influences decision-makers and what makes leaders tick. Efforts to overcome political economy obstacles to conserving and restoring forests should keep this in mind and integrate such appeals into their strategies.

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# Endnotes

1 “Deforestation” refers to the clearing of forests and subsequent conversion of the underlying land to some other use (FAO 2010). “Forest degradation” refers to the direct, human-induced reduction in a forest’s carbon stocks from its natural carbon-carrying capacity and which persists for a period of time but does not qualify as deforestation (Griscom et al. 2009).

2 Gross emissions are higher because they exclude the carbon stored by growing forests.

3 A companion paper, *Prosperous Forests*, explores these questions from the perspective of the private sector.

4 World Bank (2016).

5 ScienceDaily (2018).

6 Biodiversity *per se* might not have direct market value, but, for instance, it contains novel compounds that can directly contribute to a new natural drug on the market or serve as a source of research leads that can increase the probability of generating a successful market product with R&D. For further details, see Ding et al. 2017.

7 Soy production in Brazil in 1991 was about 20 million metric tons. In 2005, it was about 56 million metric tons. In 2007, it was about 61 million metric tons. In 2011 and 2013, it was about 75 million metric tons and 82 million metric tons, respectively. Source: Data for 1991 through 2009 are from the U.S. Department of Agriculture, as reported in Boucher et al. (2011). Data for 2011 and 2013 are from USDA (2013).

8 Dasgupta (2017) provides an excellent summary of the many studies that have been done regarding this topic for protected areas in the tropics. Although results are uneven, in large part because protection is sometimes not enforced and because some kinds of results are hard to assess, the bulk of studies find that protected status does reduce deforestation.

9 IUCN protected area categories V (protected landscape/seascape area) and VI (protected area with sustainable use of natural resources) allow for human use activities beyond tourism. For comparison, the other categories are Ia (strict nature reserve), Ib (wilderness area), II (national park), III (natural monument or feature), and IV (habitat/species management area).

10 This paragraph is based on Seymour and Busch (2016). See Chapter 7 in that publication for a more full discussion of how to stop tropical deforestation. See also Colchester et al. (2006).

11 See Global Forest Watch (2019).

12 The same yield growth may not precisely influence costs of production the same in each country, so this statement is only true roughly and in general.

13 For more on linking production and protection, see Searchinger et al. (2019), pp. 252–254.

14 Comanagement can take various forms, including community forestry, communal forestry, village forestry, joint forest management, comanagement, participatory forestry, forest stewardship and community conservation (Glasmeier and Farrigan 2005).

15 There are also a number of underlying political, social, and economic conditions, such as state failure, poverty, inequality, and conflict, that impede successful implementation of conservation and restoration at scale. However, because addressing these barriers requires strategies that extend much beyond the forest and land-use sector, we have not included these in the current analysis.

16 Indonesia Investments (2017) and Rusmana and Listiyorini (2018).

17 SPOTT (2016).

18 This section draws heavily on Ding et al. (2017), which contains a detailed assessment of the barriers to financing restoration.

19 Chandran (2019).

20 Article 14 of the ILO C169, Indigenous and Tribal Peoples Convention, 1989, states: “The rights of ownership and possession of the peoples concerned over the lands which they traditionally occupy shall be recognized. In addition, measures shall be taken in appropriate cases to safeguard the right of the peoples concerned to use lands not exclusively occupied by them, but to which they have traditionally had access for their subsistence and traditional activities. Particular attention shall be paid to the situation of nomadic peoples and shifting cultivators in this respect.”

21 The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 is commonly referred to as the Forest Rights Act.

22 Rinde (2017).

23 According to estimates by the OECD, the 51 top countries in total agricultural production (excluding countries in South Asia, which the OECD data do not address, provided nearly \$600 billion in farm support in 2015. (Searchinger et al. 2019).

24 Land Conflict Watch (2019).

25 U.S. Food, Conservation and Energy Act of 2008.

26 I Paid a Bribe (2019).

## ABOUT WRI

World Resources Institute is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity, and human well-being.

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Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

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