

# Designing Fiscal Instruments for Sustainable Forests



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# Foreword

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The world is facing unprecedented macroeconomic and environmental challenges that are linked to one another. Climate change increasingly poses challenges to macroeconomic and fiscal stability, generating physical risks as a result of climate damages as well as transition risks as a result of uncoordinated mitigation strategies. Deforestation and forest degradation increase climate risks by impairing the ability of forests to act as carbon sinks and reducing the resiliency of local communities to climate damages. Beyond climate change, the loss and decay of forests threaten global biodiversity, the provision of ecosystem services, and other core ecological functions that economies worldwide rely on.

Against this backdrop, the COVID-19 pandemic has presented governments across the world with a serious public health emergency and thrust the global economy into crisis. Recovery packages must immediately address these crises, while long-term responses must also not forget the underlying causes of the pandemic, to reduce the chance of similar future crises. Deforestation and forest degradation increase the risk of and exposure to emerging zoonotic diseases; as humans encroach on natural forests, the chances for outbreak and transmission of such diseases from animals to humans increase. For these reasons, alongside climate stability and broader sustainable development, a comprehensive green recovery must not leave forests behind.

Responding to these multiple challenges will require massive investments. For example, the estimated investment needed for countries to achieve their Nationally Determined Contributions to the Paris Agreement exceeds \$1 trillion per year over the next 15 years. Governments must mobilize and channel these resources during a time of limited fiscal space, especially as most categories of government revenue decline and available funding is committed to recovery efforts.

While increasing public expenditures for conserving forests is important and necessary, there exist additional, complementary fiscal policy options that can greatly reduce the overall cost of achieving sustainability. Fiscal policy can improve incentives for private sector stakeholders to co-invest in the sustainable use of forests. Environmental fiscal policy reforms that value natural capital can even contribute toward net domestic resource mobilization. Such fiscal instruments have so far been underutilized in addressing climate and development objectives. However, there is a growing interest among policy makers, who are responding to a developing body of evidence pointing to the effectiveness and urgency of green fiscal policies, including for forests and other sustainable land uses. This growing interest has coincided with the development of new fiscal instruments and policy combinations that can help policy makers better target and influence incentives to manage land use change and slow deforestation in a revenue-neutral or even revenue-raising manner.

This publication adds to ongoing work by the World Bank Group on how to better design and incorporate fiscal policy within the climate and sustainable development policy mix. The publication shows how various fiscal reforms can positively influence forest conservation while freeing up resources that can be used for national development. Environmental commodity taxation, previously much underused in the forest sector, can now be implemented through careful policy design in order to influence private incentives for forest conservation and land use change. Reducing distortionary agricultural subsidies is another key component of changing the balance of private incentives for land use change that can also free up additional revenues. Ecological fiscal transfers are a revenue-neutral instrument that can influence the incentives of public actors to enforce forest laws within their jurisdictions. While fiscal policy is not a “silver bullet,” there are many fiscal instruments that can influence forest conservation and should be part of a comprehensive policy package that encourages sustainable land uses.

This publication builds the capacity to reform and implement fiscal policies that reduce private and public incentives for deforestation, forest degradation, and land use change and instead encourage forest conservation, sustainable management, and green global value chains. It is also an urgent call to action. Existing fiscal policies are already providing incentives one way or the other—oftentimes incentivizing short-lived growth through exhausting natural resources and merely turning natural into physical capital without creating net value. We need to empower decision-makers to harness the power of fiscal policy for consciously creating incentives that direct future development onto a more sustainable path. We hope that this book will serve as a vital reference for policy makers to do just that as we move forward.

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# Abbreviations and Acronyms

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<b>ASM</b>	Artisanal and Small-Scale Mining
<b>BAU</b>	Business-As-Usual
<b>BTA</b>	Border Tax Adjustment
<b>CFM</b>	Community Forest Management
<b>CIF</b>	Climate Investment Funds
<b>CIT</b>	Corporate Income Tax
<b>CO<sub>2</sub></b>	Carbon Dioxide
<b>CO<sub>2</sub>-eq</b>	Carbon Dioxide Equivalent
<b>CSA</b>	Climate-Smart Agriculture
<b>DCSP</b>	Directly Competitive or Substitutable Products
<b>ECOWAS</b>	Economic Community of West African States
<b>EFT</b>	Ecological Fiscal Transfer
<b>EI</b>	Extractive Industry
<b>EITI</b>	Extractive Industries Transparency Initiative
<b>EPA</b>	Economic Partnership Agreement
<b>EU</b>	European Union
<b>FAO</b>	Food and Agriculture Organization (of the UN)
<b>FETHAB</b>	State Transportation and Housing Fund (Fundo Estadual de Transporte e Habitação), Brazil
<b>FIP</b>	Forest Investment Program
<b>FLEGT</b>	Forest Law Enforcement, Governance, and Trade
<b>FOB</b>	Free on Board
<b>FSC</b>	Forest Stewardship Council
<b>FTA</b>	Free Trade Agreement
<b>GATT</b>	General Agreement on Tariffs and Trade
<b>GDP</b>	Gross Domestic Product
<b>GHG</b>	Greenhouse Gas
<b>GVC</b>	Global Value Chain

<b>ha</b>	Hectare
<b>IBAMA</b>	Brazilian Institute of Environment and Renewable Natural Resources (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis)
<b>ICMS-E</b>	Imposto Sobre Operações Relativas à Circulação de Mercadorias e Serviços de Transporte Interestadual de Intermunicipal e de Comunicações-Ecológico (Brazil)
<b>IMF</b>	International Monetary Fund
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>ITMO</b>	Internationally Transferred Mitigation Outcome
<b>ITR</b>	Impuesto sobre Propiedad Territorial Rural (Rural Property Tax) (Brazil)
<b>ITTO</b>	International Tropical Timber Organization
<b>LSM</b>	Large-Scale Mining
<b>LULUCF</b>	Land Use, Land Use Change, and Forestry
<b>MRV</b>	Monitoring, Reporting, and Verification
<b>NDC</b>	Nationally Determined Contribution
<b>NWFP</b>	Non-Wood Forest Product
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>PEFC</b>	Programme for the Endorsement of Forest Certification
<b>PES</b>	Payments for Ecosystem Services/Payments for Environmental Services
<b>R&amp;D</b>	Research and Development
<b>REDD+</b>	Reducing Emissions from Deforestation and forest Degradation and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks in Developing Countries
<b>RIL</b>	Reduced-Impact Logging
<b>SCM</b>	Agreement on Subsidies and Countervailing Measures
<b>SDG</b>	Sustainable Development Goal
<b>SFM</b>	Sustainable Forest Management
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>VAT</b>	Value Added Tax
<b>WTO</b>	World Trade Organization
<b>WTP</b>	Willingness to Pay

*All dollars are U.S. dollars unless otherwise indicated.*



# Executive Summary

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DIRK HEINE, GARO BATMANIAN & ERIN HAYDE

*This publication responds to the growing demand for insights on how fiscal policy can be incorporated into the policy mix addressing deforestation and forest degradation. Before summarizing the key findings of this work, we provide context on why forests are important for people, economies, and the planet, and review how fiscal policy contributes to improved forest outcomes.*

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## Importance of Forests for People and the World

**Healthy forests and the biodiversity they contain provide essential services that sustain human livelihoods** and the functioning of key sectors such as agriculture and energy as well as urban areas. These ecosystem services include provision of water and climate regulation, erosion prevention, crop pollination, soil fertility, and flood control. For instance, more than three-quarters of the world's food crops rely at least in part on pollination by insects and other animals, and up to \$577 billion worth of annual global food production relies directly on pollinators (IPBES 2019). Biodiversity is essential to ecosystem health and the provision of these services. However, the Living Planet Index (LPI), adopted by the Convention of Biological Diversity (CBD), which is a measure of the state of the world's biological diversity, shows an overall decline of 52 percent over the last 40 years. Habitat loss and stress, unsustainable natural resource use, pollution, and climate change all contribute to this loss (WWF 2016).

**People also depend on forests and landscapes, which provide food, fuel, shelter, and fodder.** Forests and other natural ecosystems support rural economies in many countries and provide income sources for populations with few alternative off-farm employment options. Seventy-eight percent of the world's rural poor, including indigenous peoples, live in or near forests and their livelihoods depend on natural resources. These areas provide an important "hidden harvest" for rural populations, keeping many people out of extreme poverty. These rural and poor communities need to be engaged in creating and scaling up the solutions for achieving more sustainable management of forests and ecosystems in an integrated landscape approach. Estimates suggest that a third of the global population closely depends on forests and forest products, with 90 percent of people living in extreme poverty dependent on forests for at least part of their livelihoods (FAO and UNEP 2020).



**Forests and terrestrial ecosystems are critical for both climate change mitigation and adaptation.** The Intergovernmental Panel on Climate Change (2019) notes that “climate change creates additional stresses on land, exacerbating existing risks to livelihoods, biodiversity, human and ecosystem health, infrastructure, and food system.” The report also notes with high confidence that “all assessed modelled pathways that limit warming to 1.5°C or well below 2°C require land-based mitigation and land use change, ...including different combinations of reforestation, afforestation, reduced deforestation, and bioenergy.... Sustainable land management...can prevent and reduce land degradation, maintain land productivity.... Reducing and reversing land degradation, at scales from individual farms to entire watersheds, can provide cost-effective, immediate, and long-term benefits to communities and support several Sustainable Development Goals (SDGs) with co-benefits for adaptation and mitigation.”

**Forests are a critical component of nature-based strategies to meet the Sustainable Development Goals (SDGs)** (Jenkins and Schaap 2018; WAVES 2020). SDG 15 aims to “protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss” (United Nations 2015). Forests and their biodiversity play a crucial role in sustaining the planet’s balance, providing basic services such as soil retention, erosion control, water and climate regulation, and pollination, among others. These ecosystem services provide valuable contributions to the productivity and sustainability of the economy in many sectors. While it is difficult to precisely determine the monetary value of ecosystem services (Acharya, Maraseni, and Cockfield 2019; Costanza et al. 2017), a review of the literature finds that the marginal value of forests regarding air quality and water regulation is on average more than \$1,500 per acre per year (Ojea et al. 2016). Deforestation and forest degradation reduce the ability of forests to provide these essential services, in some cases requiring governments to take over the costs of providing these services.

**Forests are key components of national economic development.** Forests provide about 86 million green jobs (FAO and UNEP 2020), while the formal timber sector alone contributes roughly \$600 billion to the global economy (World Bank 2016b). The activities of collecting fuelwood and producing charcoal are especially important in some of the poorest regions; for example, charcoal production employs more than 7 million people in Sub-Saharan Africa (mostly informally). Non-timber forest products add an annual gross value of over \$88 billion.<sup>1</sup> Nature-based tourism is rapidly expanding (Twining-Ward et al. 2018), already accounting for \$100 billion annually (UNWTO and UNDP 2017). Deforestation and degradation of forest landscapes undermine these economic opportunities.

**Forests are a major component of national wealth.**<sup>2</sup> As a renewable resource, forests can produce benefits in perpetuity provided they are sustainably managed (Lange, Wodon, and Carey 2018). Natural capital is especially important to low-income countries, constituting 47 percent of their wealth in 2014.<sup>3</sup> Forests currently represent about \$18 billion, or 2 percent of global wealth (see table ES.1). This figure is furthermore most likely underestimated owing to mismeasurement, mispricing, illegal logging, and other factors.

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1 Including bushmeat, medicinal plants, nuts, and honey, among others.

2 Forests fall into the category of natural capital, which is measured as the discounted sum of economic rents generated over the asset’s lifetime. For more details, see Lange, Wodon, and Carey (2018).

3 This is in contrast to high-income countries, where natural capital makes up only 3 percent of national wealth. While the share of natural capital is relatively small in high-income countries, their per capita value is three times that of natural capital in low-income countries (Lange, Wodon, and Carey 2018). Sustainable development of this natural capital involves the efficient use of resources, including through productivity increases, efficient land use policies, and institutional arrangements to attract investment, among others. See Lange, Wodon, and Carey (2018) for a country-level breakdown of per capita wealth in 2014.

**TABLE ES.1**  
GLOBAL WEALTH BY TYPE OF ASSET, 1995 AND 2014

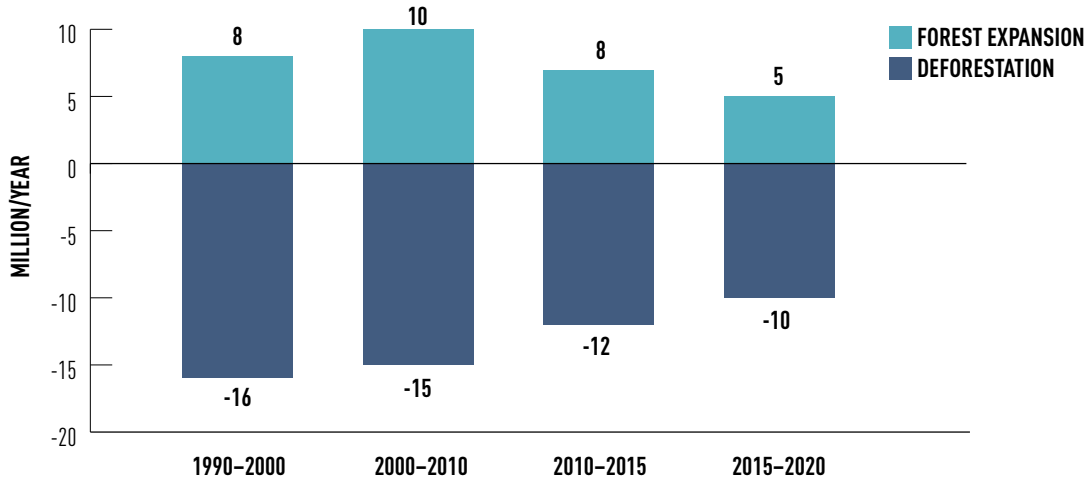
	1995		2014	
	BILLION US\$	PERCENT	BILLION US\$	PERCENT
Produced capital	164,781	24	303,548	27
Natural capital	52,457	8	107,427	9
Forest and protected areas	14,515	2	18,290	2
Agricultural land	25,859	4	39,890	3
Energy resources (fossil fuels)	11,087	2	39,094	3
Metals and minerals	997	<1	10,154	1
Human capital	475,594	69	736,854	64
Net foreign assets	-2,890	<1	-4,581	<1
Total wealth	689,942	100	1,143,249	100

Source: Lange, Wodon, and Carey 2018.

Note: The contribution of forests to global wealth is most likely underestimated owing to mismeasurement, mispricing, illegal logging, and other factors.

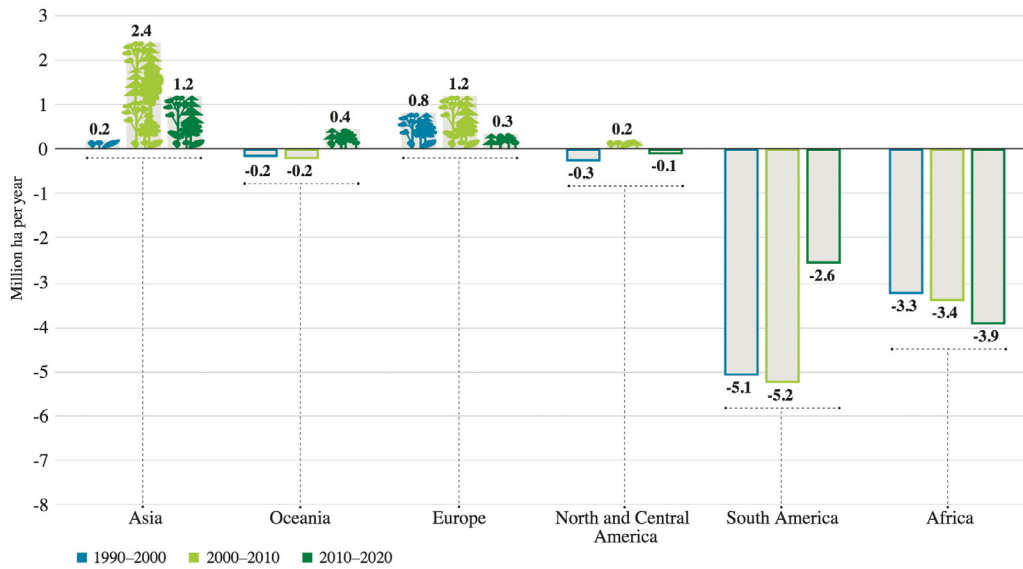
**Deforestation has been an issue for centuries; however, forest loss has significantly increased in the last several decades.** Since 1990, about 420 million hectares of forest have been lost to land conversion (FAO and UNEP 2020). However, the average deforestation rate has been decreasing from 16 million hectares per year during the 1990s to 10 million hectares per year between 2015 and 2020 (figure ES.1). Most of the deforestation is concentrated in tropical regions: more than half of all tropical forests have been lost since 1960 (IUCN 2017), and most of the deforestation and land degradation since 1990 have occurred in South America and Africa (figure ES.2).

**FIGURE ES.1**  
GLOBAL FOREST EXPANSION AND DEFORESTATION, 1990–2020



Source: FAO and UNEP 2020.

**FIGURE ES.2**  
ANNUAL FOREST AREA NET CHANGE, BY DECADE AND REGION, 1990–2020



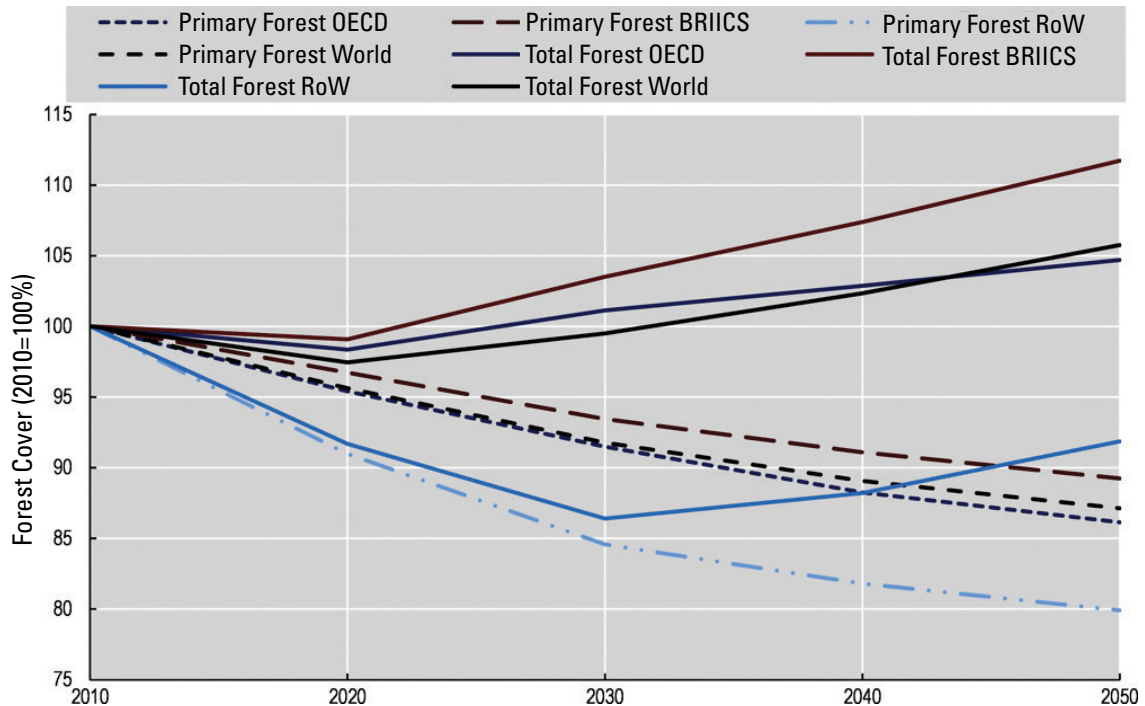
Source: FAO 2020.

Note: The estimates include data from planted forests; thus, increases in forest area may be the result of reforestation efforts or plantations (especially in Asia) and not necessarily increases in natural forest area. It is important to note that plantations do not always provide the same benefits (for example, ecosystem services) as natural forests.

**Without policy change, primary and especially tropical forests are expected to dwindle** (figure ES.3). Pressure to clear forests for land-intensive resources is forecasted to intensify. The global population is on course to grow to about 10 billion by 2050, increasing future global food demand by 50 percent (FAO 2018). The demand for forest products will also increase; for example, the total demand for timber is expected to quadruple by 2050 (World Bank 2016). Under a business-

as-usual scenario, some tropical forests may disappear completely in less than 100 years (Tyukavina et al. 2018; Vidal 2017).

**FIGURE ES.3**  
PROJECTED GLOBAL FOREST AREA CHANGE, 2010–2050



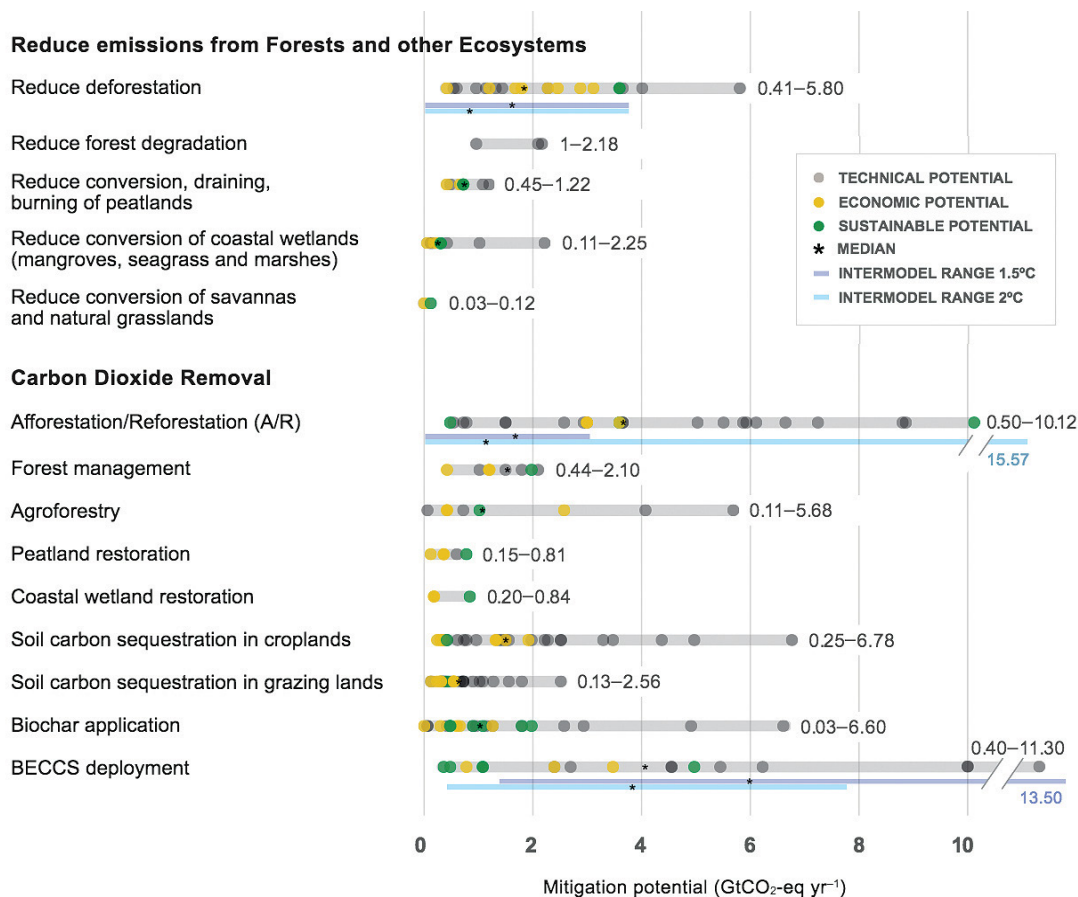
Source: OECD 2020.

**Deforestation and forest degradation are key challenges to sustainable economic development, both domestically for the affected regions and through their spillovers for the world overall.**

**Deforestation and forest degradation impair the climate mitigation and adaptation role of forests.** Forests protect the resilience of the broader ecosystem to changing weather patterns, provide safety nets for local communities against climate shocks, control and reduce desertification, and act as natural infrastructure mitigating the impact of floods and storms (for example, mangrove forests). They are thus a critical component of the transition to not just a low-carbon economy but a climate-resilient economy (figure ES.4).<sup>4</sup> The IPCC (2019) emphasizes that, to meet the goals of the Paris Agreement, addressing land-based mitigation and land use change will be indispensable. Essential components include reforestation, afforestation, reduced deforestation, and bioenergy. Furthermore, sustainable land management has been identified as a key strategy to prevent and reduce degradation while “providing cost-effective, immediate, and long-term benefits to communities and support several Sustainable Development Goals with co-benefits for adaptation and mitigation” (IPCC 2019).

<sup>4</sup> Tropical forests, in particular, represent as much as 30 percent of potential climate change mitigation (Busch and Engelmann 2014). For example, the amount of carbon stored in the forests of the Democratic Republic of Congo is nearly three times the global annual fossil fuel emissions (Stolle et al. 2015).

**FIGURE ES.4**  
**REDUCING EMISSIONS FROM AND INCREASING THE CARBON SEQUESTRATION POTENTIAL OF FORESTS WOULD MAKE SUBSTANTIAL CONTRIBUTIONS TOWARD CLIMATE MITIGATION**

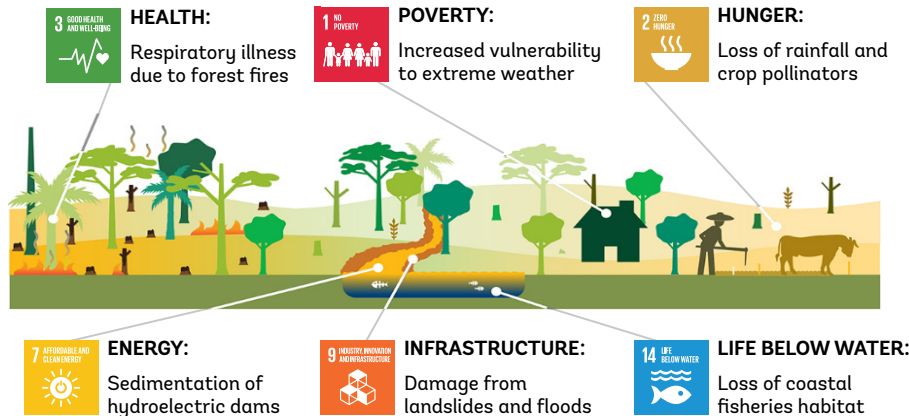


Source: Adapted from IPCC 2019.

Note: Mitigation potentials reflect the full range of estimates from studies published after 2010. Technical potential (gray bar) is the range of mitigation possible with current technologies. Economic potential (yellow dots) is the range of mitigation possible given economic constraints. Sustainable potential (green dots) is the range of technical and economic potential constrained by sustainability considerations. BECCS = bioenergy with carbon capture and storage.

**Deforestation and degradation threaten the livelihoods of vulnerable populations by eliminating the resources these communities depend on.** Low-income populations are furthermore among the most vulnerable to climate change. Deforestation significantly reduces the resilience of these communities to future climate and economic shocks (see, for example, Seymour and Busch 2016). Thus, the health of forests will greatly impact the ability to achieve both the SDGs and other interconnected development goals (figure ES.5).

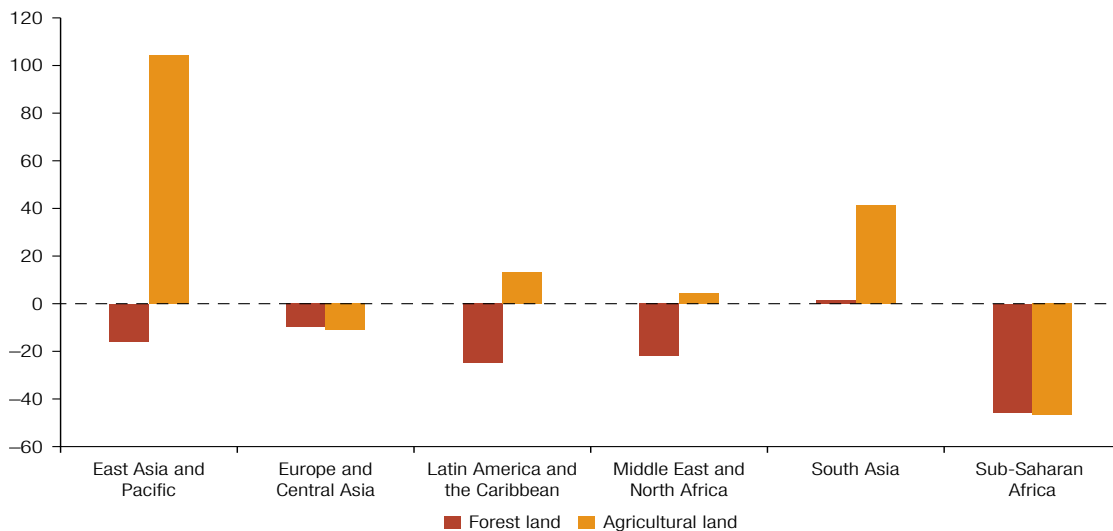
**FIGURE ES.5**  
HIDDEN WAYS DEFORESTATION UNDERMINES THE SUSTAINABLE DEVELOPMENT GOALS



Source: Seymour and Busch 2016.

**Deforestation led to losses in the per capita asset value of forests**, while the value of renewable natural capital increased between 1995 and 2014 (figure ES.6).<sup>5</sup>

**FIGURE ES.6**  
CHANGE IN PER CAPITA VALUE OF FOREST AND AGRICULTURAL LAND, 1995–2014



Source: Lange, Wodon, and Carey 2018.

**Deforestation also increases the risks of epidemics and pandemics caused by zoonotic diseases** (for example, HIV, Ebola, SARS, MERS, COVID-19). Studies indicate that changes in the mode and the intensity of land use are expanding hazardous interaction between people, livestock, and wildlife reservoirs of zoonotic diseases (Gibb et al. 2020). The risk of new zoonotic diseases is elevated in forested tropical regions experiencing land use changes (Allen et al. 2017).

<sup>5</sup> These losses may be more substantial than indicated as environmental externalities (for example, ecosystem services) as well as forest quality (that is, degradation) are not included in the valuation.

**Investing in conserving forests and the forest sector is, therefore, a win-win for governments that takes advantage of synergies across many social objectives.** Reducing deforestation and forest degradation will help countries meet a wide range of objectives, including international objectives like the Paris Agreement, and provide many important social, environmental, and economic domestic benefits. For example, maintaining native forest cover will maintain or even increase carbon stocks and thus mitigate greenhouse gas (GHG) emissions, prevent soil degradation, and protect biodiversity and other ecosystem services (OECD 2020).

## Role of Fiscal Policy in Setting the Right Incentives

### Fiscal policy has a partial but critical and underused role in mitigating deforestation and forest degradation

**Deforestation and forest degradation are caused by several interacting market failures. Policy action, therefore, requires using multiple policy interventions simultaneously. This includes, but exceeds, fiscal policy.** So far, efforts to address deforestation and forest degradation have mostly relied on sectoral regulation, private certification, and public investments. These instruments have critical roles to play (box ES.1), but they do not substitute for the need to “get the price incentives right,” which is mostly the role of tax and subsidy policies. In general, taxes and other fiscal instruments are an underutilized but key component of climate-related land use policy interventions (IPCC 2019).

**Environmental fiscal policies have been severely underutilized but are recently regaining political traction.** In 2019, 53 finance ministers signed up to a set of ambitious principles for stepping up environmental fiscal policy (see photo ES.1). However, environmental fiscal policies for the land use sector are even further behind than in other sectors. For example, while environment-related taxes make up 3–10 percent of total tax revenues in Organisation for Economic Co-operation and Development (OECD) countries, almost all these taxes relate only to environmental problems caused by fuel combustion. Fiscal policies are just starting to be used actively for addressing deforestation and forest degradation.<sup>6</sup>

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<sup>6</sup> For example, the United Kingdom implemented a Timber Procurement Policy (TPP), which stipulates that publicly procured timber must be legally and sustainably certified. In the last decade, Brazil, India, and Portugal have implemented ecological fiscal transfers to promote forest and biodiversity conservation. Some governments also offer fiscal incentives for third-party forest sustainability certification (see chapter 6 for more details).

**PHOTO ES.1**  
FINANCE MINISTERS AND LEADERSHIP OF THE UNITED NATIONS, OECD, IMF, AND WORLD BANK AGREE TO STEP UP ENVIRONMENTAL FISCAL POLICY



Source: © World Bank

Note: Meeting of the Coalition of Finance Ministers for Climate Action at the 2019 Annual Meetings of the World Bank Group and the International Monetary Fund (IMF). The Coalition agreed on a set of principles for domestic action on sustainable growth, which was unprecedented among finance ministries until that date.



**BOX ES.1** ROLE OF FISCAL POLICY AMONG THREE ‘DOMAINS’ OF ENVIRONMENTAL POLICY

**Responses to deforestation and forest degradation need to address several interacting market failures jointly.** This complexity is a great challenge for policy design. To move forward, it is essential to find policy frameworks that are simple enough to both provide practical guidance and capture the essence of the problems faced in many country settings. A promising approach is to conceptualize the roles of taxes vis-à-vis other policy instruments along three types of market failures, or “domains,” of environmental policy (Grubb, Hourcade, and Neuhoff 2014):

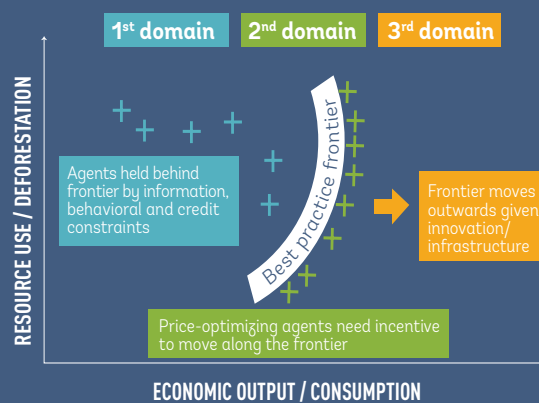
- The first domain encompasses the waste of resources owing to several barriers for price-optimizing decision-making by both households and firms. In the forestry sector, firms may engage in suboptimal decision-making for various reasons, such as credit constraints, a lack of knowledge or certainty, or risk aversion, among others.<sup>a</sup>
- The second domain relates to variations in privately optimal resource use. This relates to agents who do respond to price signals but lack the policy incentive to move to less resource-intensive production. This lack of incentives arises when environmental damages (or externalities) are not incorporated into firms’ cost structures (Bulte and Engel 2003).
- The third domain describes barriers to the innovation of more resource-efficient production techniques. This domain also encompasses changes to the production possibility frontier in the forestry sector that come from innovation to technologies and structural change—for example, as a result of investments by private and public actors into infrastructure that unlocks new production possibilities. Importantly, in the forestry sector, public investment is widely seen to be lower than the social optimum (Fowler et al. 2011).

From these domains follow policy pillars that describe the distinct types of policy action required to enable sustainable growth. The three domains are of comparable importance and are also interdependent.

**Figure ES.1.1 illustrates the role of policy in addressing the three interacting types of market failures.** For any given type of economic output, we can think of the resource use of price-responsive agents

along a “best-practice frontier.” For different prices of resources, the frontier describes the optimal available way to produce economic output (horizontal axis) for a given use of forest resources (vertical axis). Reducing the use of forest resources will also reduce economic output, as other inputs must be substituted instead and may not be readily available at comparable cost, at least in the short term. Where firms operate along the frontier is largely determined by relative prices, as information is transmitted regarding the scarcity and value of various resources. If the cost of resources rises (for example, through a deforestation-related environmental tax), firms have the incentive to reduce the resource intensity of their production either through efficiency gains or substitution. This incentive effect is the main role of environmental taxation within environmental policy approaches.

**FIGURE ES.1.1**  
THREE SETS OF MARKET FAILURES



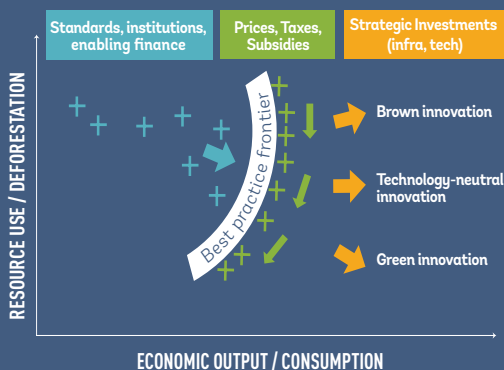
Source: Adapted from Grubb, Hourcade, and Neuhoff 2014.

**Figure ES.1.2 introduces two additional domains.**

The first domain concerns firms that are not price-optimizing and that therefore operate to the left of the best-practice frontier; they produce less output per unit of resource usage than is financially optimal at the going price of natural resources. In forestry, firms or individuals (like small-scale informal chainsaw loggers) may not operate on the frontier for a variety of factors, such as personal behavioral traits, principal-agent asymmetries, organizational or market failures, or information and credit constraints. The third domain relates to the shifts in the best-practice frontier

over time as improved technologies, infrastructure and organizational structures allow firms to produce the same level of output with fewer resources. For example, in many low-income countries, the majority of forest production may be lower than optimal because of outdated capital machinery or processes. Similarly, the creation of access roads into the forest by a mining project or the invention of a new type of agroforestry will unlock new opportunities for accessing timber independent from changes in timber prices. The frontier will move in different ways depending on the type of innovation/infrastructure driving the shift.<sup>b</sup>

**FIGURE ES.1.2**  
ROLE OF FISCAL POLICY IN WIDER POLICY PACKAGES



Source: Adapted from Grubb et al. 2014.

**Different domains call for different policy responses.** To address market failures that do not primarily stem from missing price incentives (the first domain), it is not efficient to use price-based tax policies. Instead, policy makers should focus on promoting smarter choices through regulations, information provision, project finance, and community engagement, creating institutions, among others. Key regulations include environmental standards, indigenous property rights, and the designation of protected areas. Engagement policies include public awareness campaigns and the creation of institutions to overcome collective action and principal-agent problems. Project finance can provide funding to enable credit-constrained firms and individuals to move closer to the best-practice frontier. Conversely, to influence optimization decisions (the second domain), policy makers should focus on market and other economic interventions. Here, economic measures that affect prices (such as environmental taxation) will tend to be the most effective and efficient. To address innovation and technology (the third domain), policy makers

should identify areas of strategic investment, such as electrification, that can transform market structures to create new low-carbon markets, creating business opportunities for the long-term transition to less resource-intensive production and economies.

**Regulatory policies are commonly used to reduce deforestation stemming from market failures in the first domain, but using them to substitute tax policy acting on the second domain causes inefficiencies.**

Regulations often set minimum conditions for the market access for forest products. Examples of regulatory policy include the US Lacey Act, the European Union Forest Law Enforcement, Governance, and Trade (FLEGT) initiative, protected areas, log export bans, and moratoriums on timber harvesting, among others. While regulatory policies are generally effective at impacting firms that do not respond to price signals, they often struggle with providing the necessary marginal incentives to price-optimizing producers to reduce deforestation and forest degradation. In addition, in countries where governance capacities are limited, regulatory policy may face enforcement challenges. For example, protected area boundaries may not be strictly enforced (Nolte et al. 2013), and forest law enforcement itself can lead to a variety of negative impacts (Kaimowitz 2003). Another standard problem is that the regulatory policies struggle at creating dynamic incentives for agents to keep reducing their environmental impact once they have complied with regulatory minimum standards. Therefore, regulatory policies need to be supported with complementary policies that act on other domains, such as taxation and results-based expenditure policies.

**Expenditure policies have a critical role to play on the first and third domains, but using them to substitute policy action on the second domain can be costly.**

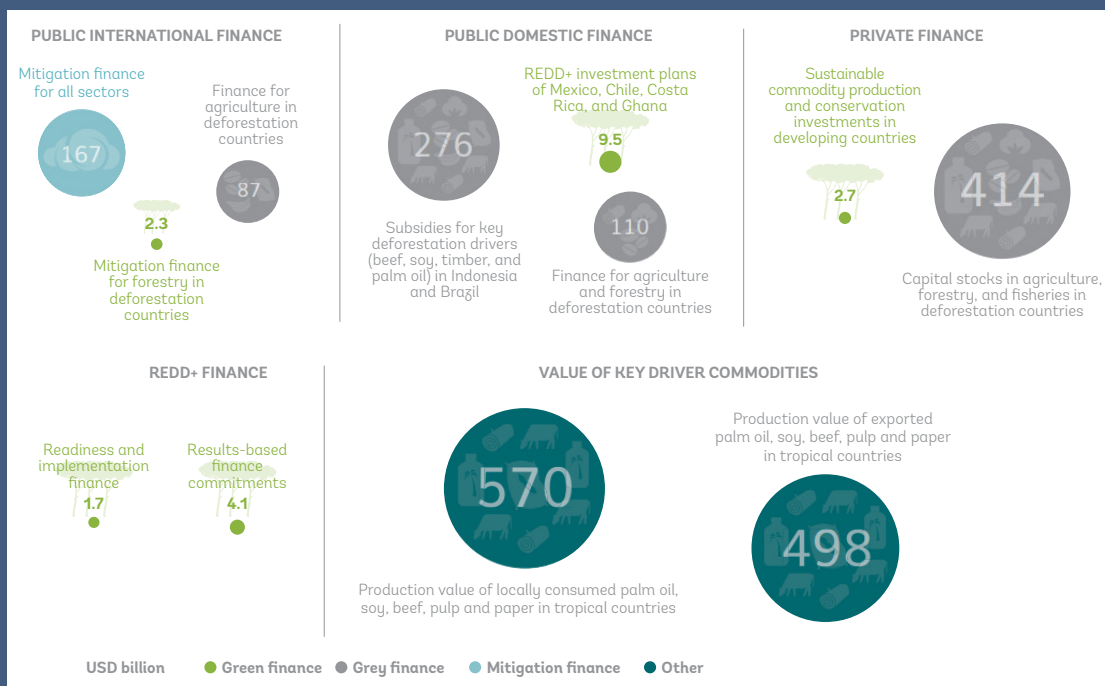
Strategic public investments are needed to push the best-practice frontier. However, they should be combined with incentives from tax policy for the private sector to have the right incentives for co-investing. Public expenditures for project finance are critical in helping actors who are not responding well to price signals (for example, because of credit constraints) move to the best-practice frontier. Furthermore, expenditure policies such as payments for ecosystem services (PES) and Reducing Emissions from Deforestation and Forest Degradation (REDD+) help improve price incentives (second domain) of agents who are not well reached by tax policy. However, these policies face important funding constraints; REDD+, in

particular, requires substantial levels of funding from developed countries (Angelsen 2008). If the funding is available, these policies can be highly effective, but funding has traditionally been in much shorter supply than identified needs. Achieving the second domain of sustainability transitions with expenditure policy then seems to be chronically limited. To be able to scale incentives when faced with budget constraints, it is essential to integrate alternative, cheaper price-based instruments like environmental taxation and the reductions of environmentally harmful subsidies.

**Policies intended to impact one domain have spillover effects in other domains.** Even though the first domain is mostly about non-price barriers to sustainability transitions, policies like project finance or regulations function more efficiently when they are accompanied by environmental taxation. For example, public campaigns to spread information about environmental problems work better if simultaneous environmental taxation ensures that resources are sufficiently expensive for the public to pay attention

to the campaign (rational ignorance problem). Project finance is more transformational if agents who receive start-up finance to overcome credit constraints at the same time face incentives from environmental taxation to choose efficient technologies. Regulations can effectively raise the agents to minimum sustainability standards, but integrating environmental taxation will keep their efforts going (dynamic incentives, rebound effect). On the third domain, there is again primarily a need for nontax policies (for example, innovation policies), but environmental taxation from the second domain has positive spillover effects for private sector co-investment into innovation efforts and for tilting the direction into which the best-practice frontier moves. All this together implies that, first, three broad types of market failures call for policy makers to use more than environmental taxation to unlock sustainability transitions and, second, environmental taxation does nevertheless play a central role and failures to use it as part of the broader policy package come at large efficiency costs.

**FIGURE ES.1.3**  
TOTAL GREEN AND GRAY FINANCE FLOWS, SINCE 2010



Source: Climate Focus 2017.

Note: Figures are in US\$ billions.

- For more details on satiscing in the forestry sector, see, for example, Diaz-Balteiro and Romero (2003); Emery (1998); Geiger and Barnett (1991); Radke et al. (2017); Rauscher et al. (2007); von Detten (2011); and Yousefpour et al. (2017).
- Innovation also applies to rules and institutions that help determine how resources are used.
- REDD is an effort to create a financial value for the carbon stored in forests and thereby offer incentives for developing countries to reduce carbon dioxide emissions from deforestation and forest degradation. REDD+ goes further and rewards forest conservation and management practices that sequester carbon.

**Fiscal policy will always impact forest production and conservation incentives; thus, the question is not whether to use it, but how to use it consciously.** Fiscal interventions in land use sectors impact forest management decisions as long as firms respond to price signals (see second domain in box ES.1). Different types of fiscal instruments have different incentive effects regarding the choice between sustainable forest management and land use change, between intensification and expansion, and between formal and informal production, to name a few. Any fiscal policies relating to land use generally have these impacts, even when finance ministries do not use them consciously for setting incentives. Hence, the incentives from existing fiscal policies may contradict government objectives, and in this case attaining overall forest policy objectives becomes costlier than necessary. Conscientious design of fiscal policies will help minimize the costs of forest conservation and sustainable management goals.

**Designing fiscal policy to take into account environmental objectives does not need to deflect from achieving other, non-environmental development policy objectives.** Environmental fiscal policies can contribute toward domestic resource mobilization that can then be used to support other development policy objectives. In many cases, the potential exists for environmental tax policies to increase fiscal space. For example, fiscal mechanisms like carbon taxes on land use emissions may be eight times less costly than command-and-control policies (Souza-Rodrigues 2018); therefore, relying more strongly on fiscal mechanisms can reduce necessary outlays while accomplishing the same amount of forest preservation. Reforms to existing fiscal policies can also free up domestic revenues, for example, by removing contradictory incentives that encourage land use change or deforestation. Certain designs for environmental fiscal reforms can also reduce informal production in forest-related industries, which could increase tax revenues and provide better jobs (see chapters 2 and 6).

**This book adds to increased efforts by the World Bank Group to increase its support to developing countries that pioneer environmental tax reforms.** Complementary initiatives include the Coalition of Finance Ministers for Climate Action, which supports developing countries in increasing their capacity to align fiscal and climate policy; the Partnership for Market Implementation, which supports individual countries as they undertake domestic policy changes toward carbon markets; and the Carbon Pricing Leadership Coalition, which promotes public-private collaboration on carbon taxation and emissions trading. The publication supports the implementation of the World Bank's 2016 Forest Action Plan, which highlights the need for a coordinated approach to the sector and includes a commitment to work with clients to build capacity regarding sustainable forest management. The target audience of the publication includes World Bank staff and policy makers in government ministries and other public institutions, especially finance ministers. This publication is designed to build the capacity of client countries and World Bank staff to reform and implement fiscal policies that reduce private and public incentives for deforestation, forest degradation, and land use change and instead encourage forest conservation and sustainable management.

**This publication is organized into 13 chapters that can be broadly grouped into three areas of study.** The first four chapters discuss how to approach environmental taxation and wider fiscal reforms for the forest sector, considering key political economy challenges like informality. Also discussed are the potential environmental or conservation benefits from adapting existing forestry fiscal regimes, considering challenges like governance capacity. Chapter 1, "Environmental Taxation and Sustainable Forest Management," argues that fiscal policy has so far been underutilized and has a critical role to play within the forest policy landscape. Chapter 2,

“Forestry Fiscal Reforms and the Informal Sector,” discusses the role of informality as a driver of deforestation and challenge for environmental tax policy, and how (new) fiscal policies might be designed to overcome this challenge. Chapter 3, “Designing Forestry Taxes to Promote Conservation,” discusses how reforms to existing fiscal regimes in the forest sector can change the incentives for forest conservation and sustainable management. It analyzes the impacts of recurrent annual charges, output taxes, and income taxes on incentives for deforestation and sustainable forest management. Chapter 4, “Using Fiscal Incentives in Fragile States,” outlines the challenges of using fiscal incentives for forest conservation and sustainable management in the context of low governance capacities and identifies some potential solutions to these challenges.

The next group of chapters discusses potential designs for environmental taxation within the forest sector, discussing how these might be extended beyond the forest to other land use sectors and how to design these mechanisms to conform to international trade law. Chapter 5, “Rationale for, and Design of, a Feebate for Forest Carbon Sequestration,” presents a fee-and-rebate (“feebate”) mechanism for revenue-neutral sustainability incentives.<sup>7</sup> Chapter 6 explores a mechanism for “Letting Commodity Tax Rates Vary With the Sustainability of Production.” Chapter 7, “National Tax Policy for Cross-Border Deforestation Problems,” expands this mechanism to apply to deforestation resulting from traded commodities in a feebate type of border tax adjustment. Chapter 8, “Export Tariffs as a Policy Tool to Reduce Deforestation,” describes the potential for the combination of agricultural export taxes and public investments to combat deforestation and forest degradation. Chapters 9 and 10, “Fiscal Incentives for Decreasing Deforestation: Does International Trade Law Restrict Export Taxes?” and “WTO Law Compatibility of a ‘Feebate’ Scheme on Imported Products,” discuss how to design a border tax feebate mechanism (such as that described in chapter 7) for compliance with international trade law.

The final three chapters identify potential reforms for land use sectors beyond forestry that might have a particular impact on reducing deforestation and forest degradation, notably through changing the incentives of public actors (chapter 11), agricultural subsidy reform (chapter 12), and reforms to extractive industry fiscal regimes (chapter 13). Chapter 11, “Addressing Public and Community Actors in Biodiversity and Forest Conservation: Ecological Fiscal Transfers and Land Tenure,” discusses how to influence the incentives of public and community actors toward investment in forest restoration, forest conservation, and sustainable management. Chapter 12, “Agriculture, Subsidies, and Forests,” examines the relationship between agricultural support policies and forest loss and suggests potential reforms. Chapter 13, “Forest-Smart Fiscal Reforms for Extractive Industries,” discusses prospective reforms to extractive industry fiscal regimes that may promote a greater degree of forest conservation. The overall publication’s key findings and policy recommendations are summarized below.

**The scope of this publication is necessarily limited by space and other constraints.** First, discussion is limited to environmental fiscal policy instruments—especially tax policy. Given the budget constraints in most countries, instruments included in the compendium are largely revenue neutral or revenue raising; this publication does not analyze expenditure mechanisms as these policies have been covered in great detail elsewhere.<sup>8</sup> Second, while this publication mainly focuses on instruments to influence the incentives for forest resource management and conservation, it also includes a discussion on how the mechanisms discussed can be adapted to

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<sup>7</sup> Carbon sequestration is the process of removing carbon from the atmosphere and depositing it in a reservoir (for example, forests).

<sup>8</sup> See, for example, CIF (2019); Alix-Garcia et al. (2018); World Bank (2014); World Bank (2012); Viana et al. (2012); FONAFIFO, CONAFOR, and Ministry of Environment (2012); Cavalier and Gray (2012); and Pagiola (2011).

impact the incentives for larger land use change (see chapters 6–8 and 11–13). Third, the focus is largely on fiscal instruments for forest-producing and forest-exporting countries. However, some consideration for demand-side measures and policies for forest-consuming or forest-importing countries is included in chapters 7 and 12. Fourth, this publication is not a definitive implementation road map: Fiscal regimes differ significantly around the world and specific reforms and instruments should be evaluated, designed, and implemented in the context of the overall fiscal, economic, political, and administrative systems of the individual country. Finally, the reforms suggested in this publication are complementary to other, nonfiscal forest sector interventions that impact other barriers to effective forest policy (see box ES.1). For example, crucial forest sector governance and revenue management reforms are described in more detail in the complementary reports *Mobilizing and Managing Public Forestry Revenue* (World Bank 2019a) and *Regulatory Tools, Effective Markets, and Private Sector Participation in the Forestry and Wood Products Processing Sectors* (World Bank 2019b). As such, the fiscal policies contained in this compendium should not be viewed as substituting for other key forest sector interventions and instead should be considered complementary to those policies.

## Key Findings

### Fiscal policy today seldom supports and often undermines the sustainability of forests

**Tax policies in place today rarely target sustainability incentives.** Fiscal policy in the forest sector is usually implemented with the goal of capturing some share of the rent and promoting industry development rather than sustainable forest management. Indeed, incentives for sustainable forest practices may be lacking entirely. The impact of fiscal incentives provided to the forest sector may not have been considered in a systematic and holistic way; thus, existing fiscal frameworks may be far from optimal in terms of both economic and environmental objectives.

**Sectoral taxes and fees may be set too low in relation to marginal social costs and current market prices available for forest sector products.** This gap can have various impacts, such as reducing government revenues, allowing inefficient logging firms to operate profitably, and reducing the price of forest products and therefore increasing consumption above optimal levels (EFI 2005; Goetzl 2006; Sizer 2000; Trofymow and Porter 1998; World Commission on Forests and Sustainable Development 1999). Evidence from a wide range of countries suggests that governments collect low shares of potential rents from forests; in certain forest-rich countries, between 3 and 30 percent of the potential economic rent from timber have been collected as tax revenues (Boyd et al. 2005; Gray 2002).

For example, during the 1990s, Indonesian forest sector taxes and fees averaged between \$20 and \$25 per cubic meter whereas free-on-board (FOB) prices of logs averaged between \$81 and \$300 per cubic meter (Leruth, Paris, and Ruzicka 2001). The situation is similar today: Indonesia collects about \$272 million annually in forest sector fees, 70 percent of which comes from a fee schedule that does not consider market prices and has remained unchanged since 1999 (KPK 2015).

Evidence on allocating forest concessions through competitive auction reinforces the idea that administratively set sectoral taxes and fees may be lower than optimal. After a public, competitive auction system was put in place in various African countries as well as Malaysia, tax authorities saw substantive increases in revenues (Boyd et al. 2005; Krelove and Melhado 2010).

For example, revenues tripled after an auction system was introduced in Cameroon (Collomb and Bikié 2000; Karsenty 2000), suggesting that what firms were willing to pay for a forest concession was much higher than assumed.

**Low sectoral taxes, combined with high agricultural subsidies irrespective of the impact on forests, send a signal that policy makers do not consider forests to be a priority** (Boyd et al. 2005). Especially when compared with other land use sectors, forests are not provided the same level of incentives as (for example) agricultural land uses. In addition, environmental fiscal incentives may be low or absent for various reasons, including low technical or enforcement capacity of fiscal administrators (Leruth, Paris, and Ruzicka 2001).

**Policy design matters. Standard forestry taxation already in use may inadvertently incentivize forest degradation or deforestation.** For example, area fees are a common instrument as they are administratively easy to establish and provide up-front revenues. While area fees can discourage land speculation and waste in logging and processing, they are also a fixed cost and therefore constitute a greater risk to industry operators who might not be able to cover these costs if market prices decline. Thus, area fees may encourage firms to intensify production, which may be more or less desirable depending on the forest characteristics and methods of intensification undertaken. Relying less on area fees and more on output-based charges (like stumpage fees) in the forestry sector can help mitigate these incentives and improve sustainability outcomes (see chapter 3). A careful consideration of the incentive impacts of various existing and proposed forest sector taxes and fees should thus be undertaken.

### **Contradictory and perverse fiscal incentives for deforestation and forest degradation exist across land use sectors**

**Fiscal policies for non-forest land use sectors may not be well aligned with governmental objectives for forest conservation and sustainable management.** Fiscal policy for land use sectors typically aims to promote industry development in line with national priorities such as food security. Many land use sector fiscal policies have not been evaluated in terms of their impact on incentives for land clearing and other environmental damages (see chapter 12). For example, fiscal incentives are commonly provided to landowners depending on the area being used for agriculture, irrespective of tree cover. In many cases, fiscal incentives for agriculture may actually prioritize forestland clearing for new greenfield agricultural plots. If fiscal incentives encourage forest conversion while other policies encourage conservation, environmental and developmental objectives are achieved at a higher cost (see chapter 1). Furthermore, the private sector then lacks incentives to develop and adopt production methods that minimize trade-offs between different land use objectives, such as agroforestry or low-impact mining.

**Existing fiscal policies for non-forest land use sectors—in particular agriculture—can increase the incentives for deforestation.** Public funding, including fiscal incentives, is heavily biased toward agriculture and therefore provides landowners with an incentive for forest conversion and land clearing. For example, Brazil and Indonesia provided more than \$40 billion in subsidies to four key deforestation-driving commodities, more than 100 times the amount these countries received through REDD+ funding (McFarland, Whitley, and Kissinger 2015).<sup>9</sup> Existing agricultural support policies may also contribute to forest loss by distorting production decisions and encouraging expansion (see chapter 12). Some countries have already begun reforming previously adverse

9 About \$346 million in REDD+ financing over the same period (McFarland, Whitley, and Kissinger 2015).

incentives; for example, prior to 2001, the European Union (EU) Common Agricultural Policy provided subsidies based exclusively on the surface area of crops; this policy was then reformed to include agricultural plots with high levels of tree cover (Buttoud 2012). In Austria, the government removed subsidies that promoted wetland drainage for agriculture and implemented incentives for sustainable land use practices instead (Kissinger 2015). Responding to the devastating peat fires of 2015 and resulting air pollution, Indonesia implemented a tax on peatland use and reformed fossil fuel subsidies (Kissinger 2015; McFarland, Whitley, and Kissinger 2015).

**The incentives of public actors may also be misaligned regarding forest conservation and sustainable management.** Where policy makers have control over land use and related decisions, allocation may be biased toward land uses that generate higher short-term returns. This bias may be a result of elite capture, political favors, the desire to maximize short-term government revenues, or other factors. Fiscal mechanisms like ecological fiscal transfers improve the incentives of public actors to invest in forest conservation and sustainable management and enforce national forest laws (see chapter 11).

### Environmental fiscal policy for the forest sector faces institutional, governance, and other implementation challenges

**As with other types of environmental policy in the forestry sector, enforcement can be a major challenge for standard designs of environmental forestry taxes too.** The forest sector in many countries is characterized by a high number of operators spread over large distances. Fiscal administrations in charge of collecting forestry taxes may be underfunded and understaffed, leading to low institutional capacity to implement and oversee environmental fiscal policy. The enforcement of forest sector fiscal policies is also complicated by high levels of informality and illegality within the sector: Informal and illegal production account for 30–90 percent of production in various forest-producing countries (Jianbang et al. 2016). Traditional forestry taxes cannot reach informal and illegal operators, leading to suboptimal revenue collection in the sector. The large number of operators, high proportion of informal production, lack of transparent and operational monitoring and verification systems, and other characteristics of the forest sector have meant that fiscal administrators cannot access the level of information needed to implement conventional environmental fiscal policy (see chapter 2).

**Fiscal policy also impacts the level of both informal and illegal production:** High tax rates can cause firms to exit the formal sector to avoid such costs (see chapter 2). In many countries, the World Bank finds that the current tax system is a significant barrier to including a greater proportion of workers and companies in the formal sector (Benhassine et al. 2016; Bruhn and Loeprick 2016; Gatti et al. 2014; Mele 2017).

### Many challenges can be overcome through new types of fiscal policy designs

**Forest sector fiscal regimes should conform to a set of best practices, dependent on country-specific contexts.** Most countries could improve fiscal incentives for sustainable forest management by modifying the structure of forestry taxes. For example, it is possible to improve the environmental incentives of most forestry-related taxes by letting the rates vary according to whether the good is certified “deforestation-free” or (even just) “legal” (see chapters 6 and 7). Forestry fiscal frameworks can also be improved through a revision of more traditional mechanisms like stumpage and area fees (see chapter 3). Independent of the tax instrument, it is important to reflect current market prices in environmental tax rates and update them for changes in



environmental damages, inflation, and growth to maintain effective price signals. In many countries, the effectiveness of taxes on forest-related commodities to reach informal production could also be improved by shifting the point of imposition to chokepoints (see chapter 6).

**New fiscal mechanisms and policy combinations can help minimize challenges to the implementation and effectiveness of environmental forest sector taxation.** The rates of taxes on both forest products and deforestation-related commodities should vary according to the sustainability of production per unit of the taxed product (see chapters 5 and 6). This can be achieved using information on production techniques from sustainability certificates (see chapters 6 and 7). Taxation-and-rebate mechanisms combined with these information instruments can help governments with limited capacity overcome monitoring, reporting, and verification (MRV) and enforcement challenges, as well as help reduce informality (see chapters 2 and 6). Importantly, these mechanisms can be easily adapted for global value chains that are driving deforestation beyond forestry products (see chapter 7). Ecological fiscal transfers can provide incentives for public actors to complement mechanisms targeting the incentives of private actors (see chapter 11).

## Policy Implications

The 13 chapters contained in this publication yield six major policy implications for policy makers in developing countries.

### 1. Forests are a valuable component of national wealth and fiscal policies should reflect this fact.

#### **Fiscal planning and budget frameworks should accurately reflect the value of forests.**

Forests are a significant feature of countries' national wealth and an indispensable component of both the environment and economy, and fiscal policies should reflect this. Forests are frequently described as undervalued; many forest benefits are not monetized and thus are not reflected in traditional or official measures of economic output and welfare (Lange, Wodon, and Carey 2018). For example, in 2012 the Ethiopian government estimated that the forest sector contributed about 3.8 percent of gross domestic product (GDP); however, a United Nations Environment Programme report determined that the total contribution of the forest sector was closer to 12.8 percent of GDP (UNEP 2016). The undervaluation of forests generally reduces support for the sector (Fowler et al. 2011; Kengen 1997; United Nations 2018) and is considered a significant cause of deforestation and forest degradation (Cavatassi 2004). A first vital step would be the systemic valuation of forest benefits (for example, as part of the preparation for natural capital accounts), which includes not only the total value of forests but also their contributions to various sectors and the sensitivity of this value to forest loss.<sup>10</sup>

#### **Policy makers should implement “forest-smart” fiscal policy across land use sectors.<sup>11</sup>**

Fiscal policy for forestry, agriculture, extractive industries, and other land use sectors always influences incentives for sustainable forest management (SFM) and conservation. However, this incentive effect may not have been considered when the policy was implemented or in subsequent evaluations. Policy makers should evaluate how fiscal incentives in all land use sectors contribute to deforestation and forest degradation (or land use emissions) to

<sup>10</sup> See the *Forest Accounting Sourcebook* (Castañeda et al. 2017) for more details.

<sup>11</sup> In the 2016 Forest Action Plan, the World Bank committed to “forest-smart” policies (World Bank 2016a).

identify which fiscal policies should be reformed. Such reviews are already underway for the environmental expenditure policy of some countries but are lacking for tax policies.<sup>12</sup>

**Policy makers should take a multisectoral and integrated approach to designing fiscal policy for sustainable forests.** While selecting the right mix of fiscal instruments along the forestry value chain can help incentivize sustainable forest management, production, and conservation, other factors are also key drivers of forest outcomes (Kishor, Castillo, and Nguyen 2015; Ongolo and Karsenty 2015). Therefore, policy makers should take an integrated approach to land use planning, incentive instruments, and broader environmental policies. An integrated landscape approach helps clarify and manage trade-offs between various land uses to ensure land is used productively and in a sustainable manner, without compromising resilience (World Bank 2016c). Additionally, policy makers should coordinate widely with stakeholders to ensure all concerned parties are involved in the reform process, which is critical to facilitate the enforcement of policies, generate needed information, and provide important checks and balances.

## 2. Using fiscal policies more actively for environmental policy can improve national economic development.

**Whether they are used consciously or not, fiscal policies incentivize firms to employ practices that are either more or less sustainable.** Fiscal policy impacts the choices about land use, the size of the informal forest sector, logging intensity and harvesting methods, and other decisions central to forests. The choice of fiscal instrument can have a variety of implications, depending on how it is designed and targeted, and some mechanisms have the potential to be very effective in incentivizing SMF. In addition, fiscal policy is a unilateral action that all countries can take, without needing to wait on international funding as with REDD+ or other PES programs. If used in combination with other instruments, environmental fiscal policy can also help overcome institutional and governance issues, such as weak capacity for MRV.<sup>13</sup>

**However, trade-offs can exist between the implementation of climate or environmental commitments and other development issues in low-income countries.** Minimizing those trade-offs requires using least-cost environmental policies and designing such policies to contribute toward achieving other development objectives such as equitable and sustainable growth. Environmental fiscal policy to incentivize SFM and conservation can achieve both.

**Using fiscal policy in such a way not only minimizes costs of environmental and climate policy but also can improve national economic development.** Many scholars suggest that environmental taxation features among the most cost-efficient climate mitigation policies, and that it can enhance rather than contradict economic development (Acemoglu, Golosov, and Tsyvinski 2011; Fullerton 2001). In particular, the revenue-generating capability of

<sup>12</sup> Several countries have started to implement "Public Environmental Expenditure Reviews" for individual spending programs and "Climate Budgeting" for tracking and managing the ensemble of several expenditure programs at the macro level. Creating transparency over spending policies through the tagging of expenditure lines is seen as a first step to better management of both direct outcomes of public programs and private sector incentives. See World Bank (2016d) for more details.

<sup>13</sup> Measuring, reporting, and verification refers to procedures for understanding countries GHG emissions as reported to the United Nations Framework Convention on Climate Change (UNFCCC). The three steps include data collection or estimation of countries GHGs and their sources; compiling this information in standardized inventories; and periodically submitting the reported information to independent review.

environmental taxation creates many opportunities for synergy between the achievement of national development and climate or environmental objectives. “Revenue-neutral shifts toward environmental taxes can have extremely low or negative costs” (Liu 2013), depending on how they are designed, and as such they represent an efficient policy option that can at the same time improve national economic development.

**Awareness of the benefits from environmental taxation is spreading.** About 100 countries have included environmental taxation or other price-based mitigation policies in their Nationally Determined Contributions (NDCs) (World Bank, Ecofys, and Vivid Economics 2017). Despite this improvement, the world is quickly running out of time if we are to stay on track to meet the objectives of the Paris Agreement. In emerging and low-income economies, the lack of environmental taxation makes environmentally damaging investments more lucrative. Developing countries’ rising interest in introducing environmental taxation is therefore even more relevant.

### 3. Reforming existing fiscal incentives is a low-cost option that can free up additional domestic revenues while accomplishing environmental goals.

**Domestic fiscal policies for land use sectors can provide contradictory incentives, (indirectly) promoting deforestation, and should be reformed.** Unequal fiscal treatments between sectors should be evaluated to determine if one land use is being prioritized over another and whether this conforms to domestic and international commitments. Where possible, blanket subsidies that support any type of agriculture irrespective of the production method should be reduced (World Bank 2018a, 2018b). Agricultural support policies should be reformed to avoid incentives for land expansion and instead encourage sustainable intensification (Foley et al. 2011; Mahon et al. 2016; Cunningham et al. 2013).<sup>14</sup> Additionally, fiscal incentives that prioritize the clearing of trees on agricultural land should be replaced with subsidy designs that promote agroforestry (Angelsen and Kaimowitz 2001; World Bank 2012b). For example, under French tax law, trees decreased the surface area eligible for subsidies until a reform in 2010 (Buttoud 2012). Reforms need to be careful though: In the French example, the design of this reform removed one deforestation incentive but also expanded the area eligible for agricultural subsidies and hence increased government outlays.

**Reforming fiscal incentives for land use sectors like agriculture<sup>15</sup> will reduce the costs of forest conservation and may in some cases free up additional government revenues** (see chapter 12). For example, to promote productive land use, Brazil uses a land tax that taxes forested land more heavily than agricultural land. This provides an incentive for landowners to clear trees from their land. At the same time, Brazil also participates in the REDD+ program, which encourages landowners to plant or maintain trees on their land. These two policies provide contradictory incentives and reducing deforestation is then achieved at higher cost; hence, an integrated reform process is needed. Where reforms make additional government revenues available, these revenues could be used to further address environmental objectives or, alternatively, be used for other development projects. For example, Brazil provided about \$10 billion in agricultural support between 2010 and 2012—an amount exceeding REDD+

<sup>14</sup> See Pretty and Bharucha (2014) for an overview of sustainable intensification principles in practice.

<sup>15</sup> In the agriculture sector, for example, implementing direct payments to farmers instead of market price supports or other coupled forms of support can help reduce distortions (and excess production) and improve conservation outcomes, especially when implemented alongside other reforms. See chapter 12 for more details.

financing by a factor of 70 (McFarland, Whitley, and Kissinger 2015). If even just 10 percent of this contradictory agricultural support was reformed, it could free up as much as \$1 billion that could be used for forest-smart projects. Subsidy reforms could then be accompanied by public investment spending in key areas, such as electrification to reduce fuelwood use (see chapters 8 and 12).

**Specific reforms to the forest sector itself may be particularly effective in reducing the incentives for deforestation and forest degradation.** Most forest sector fiscal frameworks include several mechanisms, which generally fall into two categories: recurrent annual charges (property taxes, area fees) and output-based taxes (yield or stumpage taxes, export tariffs). Output-based taxes generally provide better environmental incentives than recurrent charges. Though both types of charges reduce the amount of land allocated to forestry, output-based taxes represent less risk for firms, can expand the area of unexploited natural forest, and extend the optimal rotation period (see chapters 3 and 4 for more details on forest sector fiscal reforms). However, governments may prefer to use recurrent annual charges because they represent a stable and immediate source of income. Supplementing recurrent annual charges with output-based taxes combined with subsidies and other instruments can improve incentives for firms to conform to SFM as it incorporates environmentally efficient (Pigouvian) pricing (see chapters 3–7 for more details). Additional reforms include changes to the general business sector taxation framework, implementing a competitive bidding system for concession allocation (where not already in place), and updating administrative FOB prices, including potential adjustments for the location of concessions (see chapter 3).

#### 4. New policy combinations may be especially effective at combating deforestation.

**Policy makers have faced and continue to face barriers to the implementation of environmental tax rates.** One barrier against providing the “right” incentives for SFM and conservation was the inability of fiscal administrators to offer variable tax rates based on the sustainability of production (Leruth, Paris, and Ruzicka 2001). The large number of operators spread over wide distances combined with low governance and institutional capacity issues (such as corruption, lack of funding, and lack of personnel, among others) made it impractical to let tax rates vary depending on environmental impacts.

**However, new policy developments have made variable tax rates available to forest-fiscal administrators.** In particular, mechanisms that improve the targeting of fiscal policy have emerged (table ES.2). For example, there have been substantial developments in MRV systems since the creation of the REDD+ program. In some countries, MRV systems are developed enough to support fiscal policy (see chapter 5). For other countries, this is not yet possible. However, the recent growth of information instruments—in particular, third-party sustainability certifications such as the Forest Stewardship Council sustainable forest management certification—allows for a particularly effective policy combination that may also work for governments with low capacity (see chapters 6 and 7).

**Variable tax rates can be implemented through a taxation-and-rebate, or “feebate,” mechanism.** A feebate scheme, using an excise tax combined with tax discounts, would provide a positive incentive for firms to participate in a third-party sustainability certification scheme, which itself raises sustainability standards. Remote-sensing MRV systems like lidar can

be used to apply revenue-neutral feebates on changes in the forest stock (see chapter 5). This system gives landowners and users an incentive to conserve (or even increase) the overall physical forest stock and use agroforestry systems that minimize the trade-offs between forestry and agricultural uses. The efficiency effects of this system can be further improved by letting the tax and subsidy rates vary according to the marginal external damages and benefits from changes in the forest stock. Most likely, the effects on sustainability from a negative change are stronger than for a positive change, and hence the tax rate for reducing the forest by a given quantity will be greater than the subsidy rate for increasing the forest by that same quantity.<sup>16</sup>

**A separate or complementary type of feebate system uses information from third-party certification systems for sustainability incentives.** In this case, the rates of commodity taxes vary by production method. A preferential rate is given to producers who certify with a third party that the commodity was sourced sustainably, giving firms a direct incentive to verifiably adopt sustainability standards. This scheme can be extended to a credit system (with preferential credit supplied to sustainable producers). This feebate certification is applicable beyond timber to other commodities as sustainability certification systems already exist for many global value chains.

**Another important fiscal instrument to combat deforestation is ecological fiscal transfers (EFT).** Many countries use intergovernmental fiscal transfers of budgets from the central to regional and local governments. These transfers often use formulas to determine the size of the budget transfers. EFT build on that existing system of intergovernmental fiscal transfers by distributing a portion of central revenues to regional or municipal governments based on selected environmental indicators. EFT are currently used in Brazil, France, and Portugal, and most recently in India.<sup>17</sup> The Brazilian EFT distribute revenues based on the percentage (and quality) of local land designated as protected area, whereas Indian states receive a portion of central revenues based on the percent of forest cover in the region. Alternative indicators can be used, such as the quality of ecological services provided, reduced forest fires, avoided or reduced deforestation, and areas certified under a forest management plan or those with a third-party sustainability certification, among others. For some indicators, the needed data would already be available, although it could be improved. For other indicators, the use in an EFT would first require investments into MRV systems.

**EFT provide incentives to public actors to enforce forest conservation and management policies.** EFT are complementary to environmental fiscal instruments, which provide incentives to *private actors*, like taxes and subsidies. EFT compensate local governments for the revenues lost as a result of the restriction of economic activities on protected land. Thus, EFT mitigate local budget constraints and provide incentives for increased provision of local conservation by reducing opportunity costs at the local level (Droste et al. 2017). EFT may also enhance welfare by alleviating the budget constraints of municipal governments while allowing locally important projects to be implemented.<sup>18</sup>

16 In addition, the taxation and rebates applied may be staggered to account for the time it takes to rebuild the biodiversity lost in a given area.

17 EFT have also been proposed for Germany, Indonesia, Poland, and Switzerland.

18 While EFT are tied to environmental indicators, they are not usually earmarked for specific purposes. Transfers go to general funds of municipal governments and can be allocated to necessary public functions. This allows municipalities maximum financial autonomy (Ring 2004). Maintaining local government fiscal autonomy can reduce political problems, reduce the risk of violence, and improve local development, especially in countries with high ethnic or regional heterogeneity (Faguet 2014; Tranchant 2007). However, whether or not to earmark revenues is a design feature, and policy makers can make this decision as is appropriate for the given context; for example, there are some specific-purpose EFT in Germany for environmental purposes, but not for conservation or protected area-related indicators.

**EFT can represent a substantial source of income for subnational governments and therefore might provide strong public incentives for sustainable forest management and conservation.** For example, the Brazilian EFT accounted for between 28 and 82 percent of municipal revenues (Campos 2000). The Indian EFT is expected to bring \$6.9 billion to \$12 billion per year to Indian states, amounting to around \$174–\$303 per hectare of forest per year (Busch and Mukherjee 2018; McFarland, Whitley, and Kissinger 2015). During the first year of its operation, the Indian EFT accounted for between 0.1 and 41.3 percent of state revenues (Busch and Mukherjee 2018). Evidence shows that EFT in Portugal and Brazil have led to an increase in land area designated as protected. In India, however, the change in policy was too recent to tell if it has encouraged an increase in forest cover (Busch and Mukherjee 2018).

**TABLE ES.2**  
A SELECTION OF FISCAL MECHANISMS AND THEIR RELATIVE IMPACT ON INCENTIVES FOR SUSTAINABLE FOREST MANAGEMENT

FISCAL MECHANISM	DESCRIPTION	EFFECT ON SFM INCENTIVES	OTHER FEATURES
Excise tax	Tax on timber and other forest-derived products Can be unit-, profit-, or resource rent-based	Mixed impact – Without additional measures can increase incentives for illegal or informal logging, selective harvesting, and land use change	Revenue-increasing High administrative costs (information, enforcement)
Area fee	Fee based on harvested area	Mixed impact – Without additional measures can encourage more intensive harvesting	Low administrative costs
Export tariff	Tax on exported timber and other forest products, levied by customs authority	Mixed impact – Without additional measures can generate distortions in consumption and marketing of forest products or encourage inefficiency and waste in domestic industry	Revenue-increasing Low administrative costs
Input tax	Charges on capital equipment, labor, or other inputs	Mixed impact – Can be mechanism to help control illegal logging	Revenue-increasing
Subsidy or tax expenditure	Fiscal incentives and tax discounts	Strong impact on incentives for SFM and land use change, if well targeted	Revenue-decreasing High administrative cost
Combination of taxation and subsidy/rebate (feebate)	Taxation and rebate combination based on firm adoption of SFM or another environmental indicator	Strong impact on incentives for SFM, if well targeted	Potentially revenue neutral Medium administrative cost, if used in combination with information instruments
Ecological fiscal transfer	Portion of central government fiscal transfers allocated based on environmental indicators	Strong impact on public incentives for SFM and forest conservation	Revenue neutral Low administrative cost

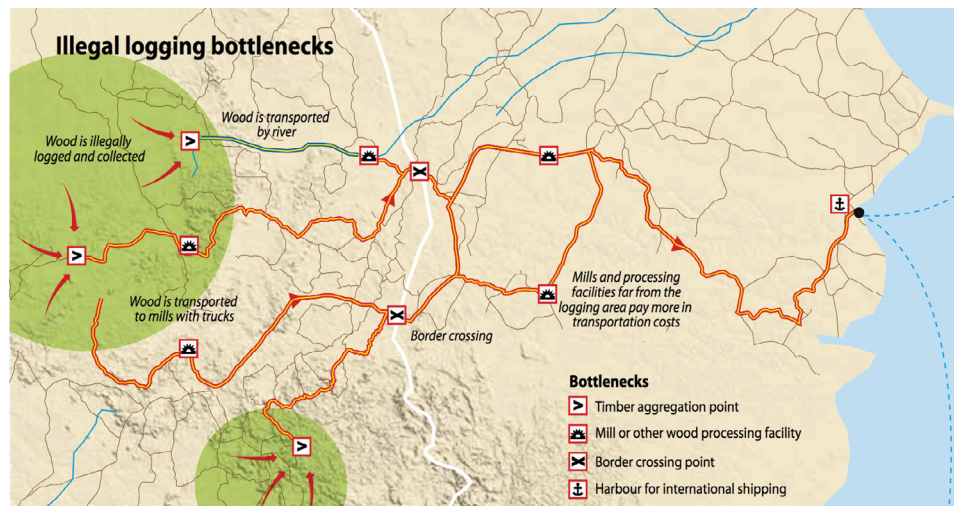
Source: Adapted and expanded from Gray 2002.

Note: This is a noncomprehensive list of forestry fiscal mechanisms. The country-level context will determine which instruments are most appropriate in a given circumstance. See chapters 3–8 and 11–13 for more details on individual instruments. SFM = sustainable forest management.

## 5. Fiscal mechanisms should be located at chokepoints to minimize enforcement and collection challenges and incentivize SFM along the supply chain.

**Locating environmental forestry taxes at chokepoints can minimize certain challenges to fiscal administration.**<sup>19</sup> The large number of forestry operators and the often large portion of informal or illegal forest production complicate the enforcement and collection of fiscal forestry policies, especially in countries with low governance capacity. However, there are certain chokepoints—bottlenecks where illegally and informally sourced (or otherwise difficult-to-tax) goods enter a formal market structure—through which forest products must flow (especially products intended for export). Key chokepoints for the forest sector include timber aggregation points such as timber depots, sawmills or other processing facilities, border crossings, or international shipping ports (figure ES.7).

**FIGURE ES.7**  
USE OF ILLEGAL LOGGING BOTTLENECKS (CHOKEPOINTS) FOR POLICY ENFORCEMENT, INCLUDING FOR TAXES



Source: Nelleman and INTERPOL 2012.

**Locating environmental taxation at chokepoints can minimize corruption opportunities in the forest sector.** Corruption in the forest sector includes activities such as the falsification of documents, fraudulent interactions, bribery, money laundering, and tax evasion (Maguire 2013). Problems of forest sector corruption are exacerbated by insecure tenure arrangements and weak governance and monitoring capabilities. Corruption, fraud, and tax evasion are particularly pervasive in the forest sector; for example, the revenue and tax income lost due to illegal logging alone is estimated to be at least \$10 billion per year (Nelleman and INTERPOL 2012). Initiatives like FLEGT have sprouted to address these challenges by increasing transparency, but fiscal policy design also has a key role to play here. FLEGT and other such initiatives can be complemented by locating environmental taxes at chokepoints. By locating taxes at chokepoints, the number of taxable agents is fewer and fiscal capacity and MRV systems may be more developed, thereby minimizing opportunities for corruption, fraud, and tax evasion.

<sup>19</sup> However, there are certain types of deforestation for which there are no chokepoints, like deforestation caused by internal demand for charcoal. In these cases, environmental tax policy may not be the right instrument.



**Locating environmental forestry taxes at the level of upstream processors or other chokepoints can incentivize sustainable supply chains.** Taxes may fail when they are imposed at the wrong segment of a supply chain. An environmental tax on timber harvesters based on the sustainability of timber might not incentivize many operators to improve their production methods. Instead, they might choose to evade taxes (whether through informal or illegal production, or bribery of forest tax collectors). However, if an upstream processor or depot faces a taxation mechanism that varies based on whether their inputs were sourced sustainably, these actors face an incentive to purchase timber from legal and sustainable harvesters and lower their tax bill. Locating taxes at chokepoints is especially effective for forest products, as in many cases illegal product is mixed with legal product at depots. This is not to say that fiscal policy can replace enforcement or regulatory policies, but that fiscal policy can be designed to minimize these barriers.

**Export facilities are a primary example of a chokepoint that exists in virtually every country.** Where deforestation in a country is driven by the export of a commodity, export taxes can be implemented in combination with tax discounts for certified sustainable production methods. Using chokepoints reduces opportunities for fraud, and export taxes can be used to encourage sustainability as well as value added for domestic industry, if used in combination with other mechanisms. However, standard export taxes can be seen critically from a perspective of international trade facilitation, although they align with World Trade Organization (WTO) law. Nevertheless, well-designed export taxes addressing market failures facilitate the conduct of trade along true comparative advantages.<sup>20</sup> Despite important drawbacks, exports represent a simple and effective point at which to implement environmental taxes in countries where the enforcement of environmental policies through internal taxes is not feasible because of evasion and informality problems.

**Producer countries with sufficient fiscal space should consider selectively reducing export taxes for certified sustainable products, to participate in global value chains while safeguarding sustainability.** Combining export taxation with reduced tax rates (or waivers) for products with third-party certification creates the incentive for sustainable production and encourages integration into international markets. Using third-party certification in fiscal policy efficiently puts the burden of proof for determining the level of sustainability on firms, reducing tax administration costs.

## 6. International donor funding could help overcome political challenges to the implementation of certain environmental fiscal instruments.

**The right fiscal policy mix can help close the gap between financing needs for sustainable forests and available funds during a time of globally worsening fiscal space.** Existing fiscal policy for forest protection relies mostly on direct expenditures. Achieving sustainability objectives exclusively through these expenditure policies would require unprecedented increases in funding. Given fiscal pressures in developing countries, raising these large increases in funding from domestic sources is unlikely. Funding has come instead from

<sup>20</sup> Failures to internalize environmental costs distort international trade (Chichilnisky 1994; Stiglitz 2006) away from allocative efficiency, which is given when goods are produced in the location where the opportunity costs to society are the lowest. Trade should be conducted according to genuine comparative advantage, that is, comparative advantage on the basis of true production costs. It is essential, therefore, that countries implement policies to internalize external costs from traded commodities (World Bank 2020). In countries where the enforcement of environmental policies through first-best policy instruments is not feasible, export taxes can play an important second-best role because they use a chokepoint (ports) that is difficult to evade.

international donors through REDD+, but it is estimated to be far less than needed to achieve forest sustainability objectives. The vast financing gap may become worse in the context of the current dramatic worsening of fiscal space in both developing forest nations and donor countries. As, despite the COVID-19 recession, solutions for sustainable forests must be found, there is a need to find a new policy package that can provide the needed boost to forest sustainability with fewer revenue needs. Above we have discussed several options, notably the alignment of contradictory fiscal policies for competing land uses such as agricultural subsidies and property taxes that increase land clearance, revenue-raising environmental taxes, and revenue-neutral approaches like feebates and ecological fiscal transfers. These policies enable the scaling up of fiscal policies for sustainable forests without requiring much additional funding.

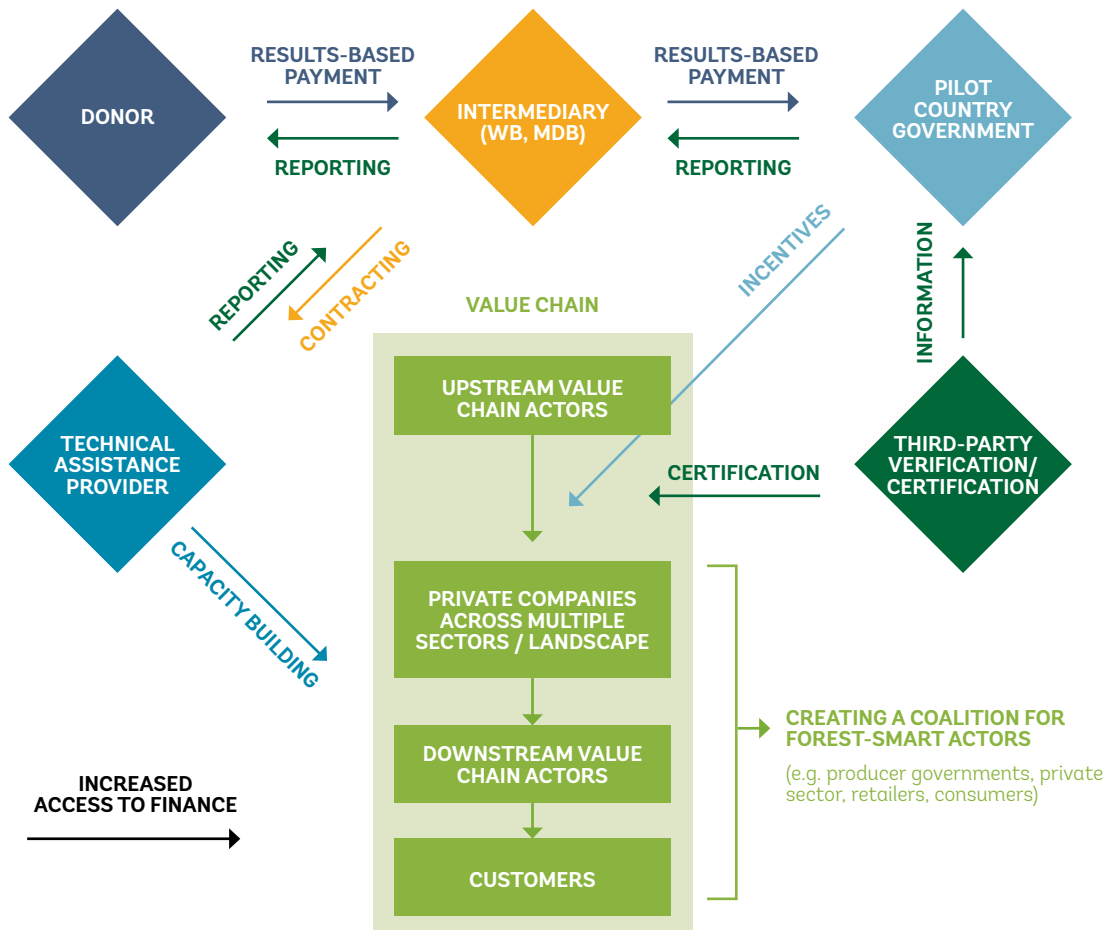
**Nevertheless, there remains a large financing gap for meeting global forest targets—and a justified need for continued international burden sharing.** Fiscal reforms may be limited by fiscal capacity, particularly in the short term. The mentioned revenue-raising or revenue-neutral instruments enable the scaling up of forest protection in a time of fiscal scarcity, but they do not substitute for the continued need to use expenditure policies like PES and REDD+. These are complementary policies as they address separate market failures. And irrespective of the combination of policy instruments, the prevention of deforestation and forest degradation in developing countries continues to generate large, globally shared external benefits, which justify large, global burden sharing in any conservation cost. The policy mix affects what the size of that conservation cost is, not how it should be split. The policy instruments proposed in this compendium would imply a step-up in domestic policy action by forest nations, but that should not come at the expense of international solidarity. Instead, countries should continue to be rewarded for such reforms—for example, through results-based payments such as policy crediting. In this way, the gap between the overall financing needs to meet global forestry objectives and the financing available could be shrunk in a way that benefits recipient and donor countries alike.

**Phasing in the new fiscal policy instruments may require additional donor funding to support structural change, overcome political economy problems, and compensate initial revenue losses.** Ecological fiscal transfers can be introduced as a revenue-neutral change to the existing intergovernmental fiscal transfer systems. In this case, the formula for the distribution of transfers between subnational governments changes without altering the total amount of the transfers. While this is possible, it can also be politically challenging. Here donor countries may be interested in supporting the phase-in of EFT financially. Sharing in the cost for an “almost revenue-neutral” EFT may still be better than many alternative forest sector interventions where a much greater share of the cost is borne internationally. Another core concern for donors is the likelihood of an intervention to be reversed when international funding ends. Here it is important that an EFT would imply changes in central government fiscal laws and create strong vested interests among subnational governments, which should both support its persistence and local ownership. A similar case for international co-financing exists for reforms that let taxes on deforestation-related commodities vary according to the certified sustainability/legality of production. Again, these reforms can be designed to be revenue neutral, but politically it is easier if the reform starts with just a decrease in taxes for certified sustainable commodities without an immediate matching rise in the default tax rate for commodities without the certification.

**Donors could help cofinance the initial shortfall in commodity taxes.** Given the argument on relative costs in comparison with alternative interventions, domestic co-financing and legal change, structural change of market incentives, and creation of vested interests for persistent change, the suggested policy reforms seem an effective investment for donors. This co-financing may also be in the interest of donors who would like developing countries both to reduce their use of export taxes on commodities and to raise the sustainability of these commodities. In this case, a forest nation could start reducing the export taxes for certified sustainable commodities, and a donor country could share in the revenue shortfall.

**Such international co-financing in the introduction of environmental fiscal policies could function within existing results-based payment systems.** A type of results-based payment called policy crediting already supports environmental tax policies by providing payments per unit of environmental improvements that were achieved as a direct outcome of the policy change. Thus, there already exist frameworks for facilitating such international collaboration. However, a more structured approach to potentially expand such collaborations is shown in figure ES.8.

**FIGURE ES.8**  
ITTO PROPOSITION FOR AN INTERNATIONAL TRANSFER SCHEME TO INCENTIVIZE HARVESTED WOOD PRODUCT VALUE CHAINS



Source: Dieterle 2017.  
Note: ITTO = International Tropical Timber Organization.

**These international transfers could be transitory.** As the recommended policy would provide strong incentives for firms in the informal sector to join the regular economy, the government's ability to raise revenue would improve. The abovementioned additional fiscal incentives for domestic industry would equally raise that revenue potential against business-as-usual trajectories. Most important perhaps, transitory international support of a pilot scheme could reduce the risk and cost for governments in testing such schemes. After it is established that such mechanisms work, international support should be scaled back, and that exit plan should be transparently communicated from the beginning. This will minimize the reliance on the generosity and political winds of donor countries, which can be variable.

## Conclusion

**This publication presents a first look into how governments can better design fiscal policies to reduce deforestation and forest degradation while promoting sustainable growth.** Significant knowledge gaps remain for the topic, including information at the country level on how fiscal instruments are currently applied, the impact on incentives from these policies, and other sectoral data. Additionally, the principles and recommendations of this publication have not been systematically piloted in a national forestry context. Future work should incorporate further case studies of existing fiscal systems, results of fiscal reforms, and further country-level operational studies. The guidance provided by this publication should hence be viewed as a starting point to provide policy makers with a range of options to help design a context-appropriate fiscal regime for forest conservation and sustainable management. The major findings are summarized below.

### **Environmental fiscal policy interventions can help meet important national objectives.**

Environmental fiscal policy is one important tool to help countries meet the objectives of both the Paris Agreement and SDGs, as well as other national development priorities. Fiscal policies that help reduce deforestation and forest degradation support climate change mitigation and adaptation, water and food security, and the reduction of poverty. They contribute to green growth through the advancement of sustainable supply and value chains, and the formalization of a sector often plagued by informality and illegality. Additionally, environmental fiscal reforms can contribute toward domestic resource mobilization, or at least reduce the large financing gap for meeting forest sustainability targets. Addressing a subset of forestry issues with environmental tax policy can free up resources that then can be used to more effectively address those subsets for which tax policy is not a solution.

### **Environmental fiscal policy to incentivize sustainable forests includes a variety of reforms and new policy instruments.**

Key fiscal reforms include a reduction in fiscal incentives that (indirectly or directly) support deforestation, thus balancing incentives for land use change. In many countries, existing fiscal sectoral policies provide contradictory incentives for forest conservation and management; for example, forested land in some countries is taxed higher than agricultural land, directly providing an incentive for land clearing. Reforming such fiscal incentives to prioritize agroforestry or afforestation could help reduce deforestation as well as free up additional revenues. Reforms to existing regimes and new environmental tax mechanisms can also better align the incentives of private actors to engage in sustainable forest management, production, and conservation. Some relatively simple reforms to existing forestry-fiscal regimes could improve incentives, for example by relying relatively more on output-based charges. The feebate mechanism also has the potential to overcome challenges to environmental taxation in forestry and other land use sectors, especially when used in combination with information

instruments. Additionally, certain fiscal mechanisms (such as EFT) can help align the incentives of public actors to engage in SFM and conservation.

**Subsidy reforms:** Policies should be evaluated in terms of their respective impacts on the incentives for deforestation and forest degradation. Where policies are found to provide contradictory incentives, the fiscal regime should be reformed and reconciled. Policy makers should replace certain agricultural support policies, including subsidies, that incentivize deforestation with those that promote deforestation-free production. Especially, support tied to output or market prices (coupled support) should be replaced with decoupled, direct payments to farmers (potentially tied to ecological outcomes—for example, PES) to reduce the distortion of production decisions and improve environmental sustainability.

**Ecological fiscal transfers:** Policy makers in countries that use intergovernmental fiscal transfers between central and local governments should improve the incentives of local governments to attain forestry objectives by including environmental criteria in the formula used for calculating the size of transfers. Several forest-related conservation criteria are possible, including forest cover, quality of area designated as protected area, forest carbon stocks (for example, aboveground biomass), percent of area under forest management plan, or area certified under third-party sustainability certification. The environmental indicator(s) chosen should be determined based on governance capacity, as some indicators are relatively more complicated to use.

**Forest sector fiscal reforms:** Forest sector fiscal frameworks should conform to a set of best practices, dependent on country-specific contexts, such as economic, political, and social factors. Output-based taxes, recurrent annual charges, and other charges can be reformed to better align with environmental objectives.

**Feebates:** Policy makers seeking to improve incentives for sustainable forestry in a revenue-neutral manner should consider the carbon sequestration-based feebate mechanism or the sustainability certification-based feebate mechanism, depending on the governance capabilities in the country in question. Where robust monitoring and land tenure systems may be lacking, third-party sustainability certification-based feebate mechanisms provide a “widely applicable” alternative to the carbon sequestration-based feebate. This mechanism can be extended beyond the forest sector to other land use sectors like agriculture and extractive industries.

**Export taxes:** Policy makers should carefully weigh any plans to phase out existing forest-related export taxes with the need for a robust environmental fiscal policy that is resistant against informality and other types of evasion. Although they have important drawbacks, export taxes use a strong chokepoint, and authorities can thus better enforce environmental export taxes than tax policy in the interior of some countries. Ideally, policy makers should use variable export tax rates based on the sustainability of production methods to reduce deforestation from internationally traded commodities and their value chains. One way to implement variable tax rates is through the feebate mechanism. This instrument can also be used for land use sectors beyond forestry.

**Implementation challenges can be overcome through careful policy design and complementary policy interventions.** One challenge to environmental fiscal policy implementation is the projected impact on government revenues; many governments may not have the capability to invest in reforms with high administrative costs or technical capacity needs, or those that entail large expenditures from the national budget. Accordingly, certain fiscal instruments can be designed to

be revenue neutral or revenue raising, such as environmental taxation, feebates, subsidy reform, and EFT reforms. Additionally, forest sector taxation enforcement is often complicated by the large number of actors in the sector, institutional and governance weaknesses such as corruption, and the inability of fiscal administrators to target the often-large informal sector. Fiscal administrators can alleviate these issues if environmental taxation is targeted at chokepoints, such as at the customs gate.

**Other, complementary policies will be necessary to comprehensively address all sources of deforestation.** Given the complexity associated with deforestation, there is a need for additional reforms and investments beyond fiscal policy. Such investments include improvements in forest law enforcement, MRV systems, and administrative and other capacities. Regulatory measures such as environmental standards, protected area designation, and bans on the harvesting of certain species are also key to the protection and sustainable growth of the forest sector. Expenditure policies, such as PES and REDD+, are also especially important for providing landowners with the incentives to enhance ecosystem services from forests (for example, carbon sequestration and watershed services). Transparency initiatives and demand-side measures, along with other policies, will also be key components in the forest policy mix. Additionally, stakeholder consultation is key: Many vulnerable groups directly rely on forests for their livelihoods and indigenous, forest-dwelling communities should be involved in the fiscal reform process; the involvement of civil society groups and certification companies can importantly improve the enforcement of policies.

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