Background Analytical Study 1

Forest Ecosystem Services [1]

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[1] In response to paragraph 23 of resolution 12/1, the UN Forum on Forests Secretariat commissioned four background analytical studies on the contribution of forests to the achievement of the Sustainable Development Goals under review by the high level political forum on sustainable development in 2018, in consultation with the Bureau of the thirteenth session of the Forum. The studies include: (a) forest ecosystem services; (b) forests and water; (c) forests and energy; and (d) the sustainable consumption and production of forest products.

[2] The views and opinions expressed herein are those of the authors and do not necessarily reflect those of the United Nations Secretariat. The designations and terminology employed may not conform to United Nations practice and do not imply the expression of any opinion whatsoever on the part of the Organization

Untapped Potential: Forest Ecosystem Services for Achieving SDG 15
UNFF13 Background Analytical Study

Executive Summary

The world's forest ecosystems provide critical and diverse services and values to human society. As primary habitat for a wide range of species, forests support biodiversity maintenance and conservation. Forest growth sequesters and stores carbon from the atmosphere, contributing to regulation of the global carbon cycle and climate change mitigation. Healthy forest ecosystems produce and conserve soil and stabilize stream flows and water runoff—preventing land degradation and desertification, and reducing the risks of natural disasters such as droughts, floods, and landslides. Forests also serve as sites of aesthetic, recreational, and spiritual value in many cultural and societal contexts, and contribute to poverty eradication and economic development by providing food, fiber, timber, and other forest products for subsistence and income generation.

Yet continuing forest loss worldwide negatively impacts the livelihoods of millions of people and poses major challenges to sustainable development, in part because these forest ecosystem services continue to be undervalued, or not valued at all. Fortunately, the global community appears to be arriving at an important turning point, with a number of recent developments pointing to a positive trajectory of progress—including various commitments and agreements made in recent years such as the New York Declaration on Forests (NYDF), the Paris Agreement, the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs), and the UN Strategic Plan for Forests 2017-2030 (UNSPF) and its Global Forest Goals (GFGs).

Partly in response to these global policy signals and developments, governments are beginning to integrate consideration of forest ecosystem services into their development policies and plans. However, these efforts are just beginning and much progress is yet to be made. At the same time, investments in forest conservation and forest ecosystem service provision are also growing, with finance coming from public and private sources. Ecosystem markets are developing and expanding to channel these payments for environmental services—including markets for forest carbon, habitat protection and restoration, and water provision.

Collectively, these global policy signals and growing investments provide a positive foundation for continued progress in enhancing the contribution of forest ecosystem services toward achievement of SDG 15. Existing international guidance documents such as the UN Forest Instrument and the UN Strategic Plan for Forests provide a framework for national actions and international cooperation to sustainably manage forests, and should continue to be promoted as tools to support countries' efforts at integrating forest ecosystem services into all aspects of national policymaking and planning. Ultimately, countries must establish regulations and incentives which properly acknowledge and account for the values provided by forest ecosystems to society, and which direct sufficient finance to safeguard these services over the long-term for sustainable development. While evidence suggests this is beginning to happen, continued leadership and bold action will be necessary to scale-up this progress in order to fully achieve the 2030 Development Agenda goals.

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1. Introduction: The Growing Need to Sustainably Manage Forest Ecosystems and their Services and Benefits

The world's forests cover thirty percent of the earth's surface, and serve as a source of diverse values to human society. Healthy forest ecosystems provide a wide range of services – including reliable clean water, climate regulation, and productive soils – and forests underpin many of society's basic needs, economic processes, and cultural or spiritual values. Responsibly managed forests are critically important in slowing climate change while improving the quality of peoples' lives. Not only are forests home to more than 80% of all species living on land, they are also crucial sources of food, medicine, drinking water, and immense recreational, aesthetic, and spiritual benefits for millions of people.

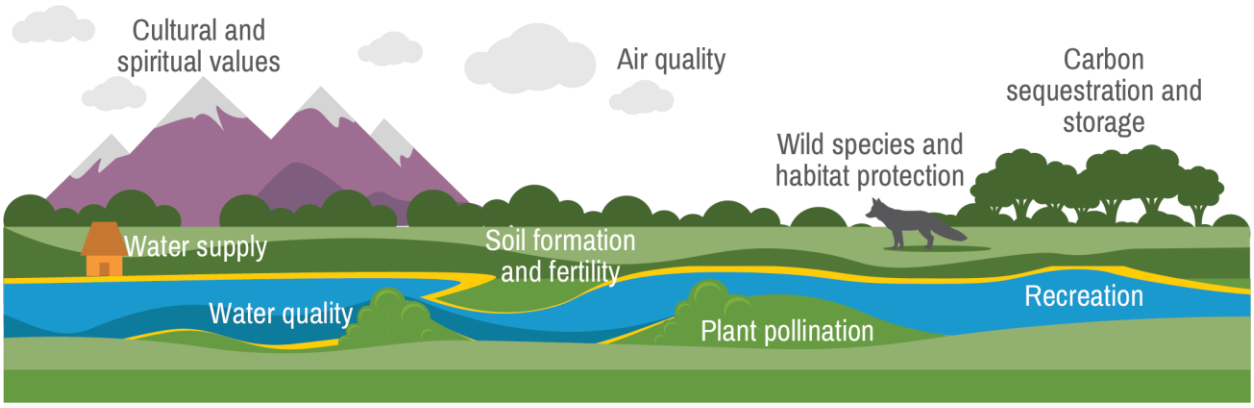
Yet except for primary goods like food, fuel, and fiber, most ecosystem services do not have market values. This means that protection of these services is rarely considered in economic decisions, contributing to their ongoing decline. The Millennium Ecosystem Assessment for instance has found that more than 60% of ecosystem services are being degraded faster than they can regenerate.[3] Growing global demand for forest and agricultural products is leading to the loss of thirteen million hectares of forests every year—an area the size of Greece—while the persistent degradation of drylands has led to the desertification of 3.6 billion hectares—more than 20% of the entire global land area. Deforestation and desertification caused by human activities and climate change pose major challenges to sustainable development and are negatively impacting the lives and livelihoods of millions of people worldwide—slowing global progress in the fight against poverty.[4]

Figure 1. Ecosystem Services Provided by Forests

Source: Forest Trends

[3] Millennium Ecosystem Assessment. *Ecosystems and human well-being.* Vol. 5. Washington, DC: Island Press, 2005.
[4] http://www.un.org/sustainabledevelopment/biodiversity/

Figure 2. Examples of Ecosystem Services Provided by Healthy Landscapes



Healthy natural habitats and working lands provide society with a wide range of benefits—from reliable flows of clean water to productive soil to carbon sequestration. People, companies, and societies rely on these services for raw materials, production processes, and climate stability. These benefits are known as ecosystem services. Some examples of ecosystem services include the purification of air and water, regulation of water flow, pollination of crops and natural vegetation, and the provision of cultural and spiritual values associated with nature.

Source: Forest Trends' Ecosystem Marketplace, 2016. "An Atlas of Ecosystem Markets in the United States." Washington DC: Forest Trends.

1.1 Biodiversity Conservation

Forest biological diversity is a broad term that refers to all life forms found within forested areas and the ecological roles they perform. As such, forest biological diversity encompasses not just trees, but the multitude of plants, animals and micro-organisms that inhabit forest areas and their associated genetic diversity.[5] Tropical, temperate and boreal forests provide the most diverse sets of habitats for all types of life, together holding more than 80 percent of the world's terrestrial species of animals, plants and insects.[6] Within specific forest ecosystems, this biodiversity is required in order for the ecosystem to continue maintaining its basic ecological processes. The loss of biodiversity can make forests less resilient to withstand threats such as climate change and habitat degradation, creating a negative-feedback cycle that ultimately leads to even more biodiversity loss.

Forest biodiversity provides society with numerous ecosystem services, including by serving as a storehouse of genetic material for the development of medicines to treat illness and disease. Recent estimates suggest that three-quarters of the top-ranking global prescription drugs contain components derived from plant extracts, many of which come from the world's forests. Yet this potential has barely begun to be explored, as less than 1 percent of the world's 80,000 tree species have even been studied for potential use.[7]

[5] https://www.cbd.int/forest/what.shtml
[6] http://www.un.org/sustainabledevelopment/biodiversity/
[7] United Nations. 2017. "Goal 15 – Why It Matters," United Nations. Accessed November 13 2017. http://www.un.org/sustainabledevelopment/biodiversity/.

Yet as the world's forests continue to come under threat from degradation and fragmentation, the resulting habitat loss is leading to a decline in global biodiversity. The planet is in the midst of a mass extinction event, with entire species going extinct at rates never seen before in human history.[8] Between 1972 and 2020, it is expected that the average population size of vertebrate species globally will have declined by two-thirds.[9] While previous mass extinctions have been caused by asteroids, major volcanic eruptions, and dramatic climate fluctuations, this one is unique, because humans are primarily to blame. As human populations have grown, so have our cities, suburbs, industrial areas, and agricultural lands, disrupting or displacing the forests and other natural ecosystems that were once there—and the biodiversity they supported.

1.2 Climate Regulation

Forests play a key role within the global carbon cycle, removing carbon dioxide (CO_2) from the atmosphere and converting it to wood as they grow, and releasing carbon dioxide back into the atmosphere when trees are burned or decay. The forest and land-use sector is thus unique in that it can act as either a source or a sink for carbon, with the potential to sequester carbon and thus reduce net CO_2 emissions.Deforestation contributes 10% of global greenhouse gas emissions,[10] and represents the second-largest source of annual CO_2 emissions after fossil fuel combustion.[11] If tropical deforestation was a country, its emissions would be the third-largest in the world—behind only China and the US.[12]

Halting this deforestation and encouraging replanting or sustainable forestry management practices could potentially contribute over one-third of the total emissions reductions that scientists say are needed by 2030.[13] Policymakers around the world recognize the potential for forests and natural land area to combat climate change; a total of 97 countries mentioned specific plans to reduce emissions from deforestation or increase forest cover in their Paris Agreement commitments. Forests and the timber they produce sequester and store more carbon than other terrestrial ecosystems and, in line with the emphasis made in Paris, must play an important role in mitigating climate change.

1.3 Soil Conservation and Prevention of Land Degradation and Desertification

In various forest ecosystem types all over the world, forests play a critical role in building and maintaining soil fertility. Trees take up nutrients from the soil to enable their growth, and return nutrients back to the soil as they decay. Forests also act to promote soil stability, as the complex networks of tree roots present

[8] Chivian and Bernstein 2008, Thomas et. al., 2004.
[9] WWF, 2016.
[10] Union of Concerned Scientists. 2013. http://blog.ucsusa.org/doug-boucher/ten-percent-of-greenhouse-gas-emissions-come-from-deforestation-342
[11] Blanco G, Gerlagh R, Suh S, Barrett J, de Coninck HC, Morejon CFD, Mathur R, Nakicenovic N, et al. 2014. "Chapter 5 - Drivers, trends and mitigation." In: Climate Change 2014: Mitigation of Climate Change. IPCC Working Group III Contribution to AR5. Cambridge University Press.
[12] https://www.cgdev.org/page/infographics-why-forests-why-now
[13] https://www.iucn.org/downloads/forests_and_climate_change_issues_brief_cop21_011215.pdf

in a healthy forest act to hold soil in place, even on steep hillsides or during heavy rainfall when soil would otherwise erode away.

Yet as forests worldwide are being cleared, the resulting land becomes vulnerable to a process of soil degradation, which in some cases can lead to desertification and the inability of the land to support either agriculture or forestry. While desertification can be reversed through intensive land restoration interventions, the constraints facing many of the world's farmers, particularly in the Global South, leads to a scenario in which degraded land is typically abandoned in pursuit of more productive soils—often leading to further forest clearance.

Worldwide, 2.6 billion people depend directly on agriculture for their livelihoods, but 52 percent of the land used for agriculture is moderately or severely affected by soil degradation.[14] This land degradation affects 1.5 billion people globally, including an estimated 74 percent of the world's poor. The current rate of arable land loss—in many cases directly tied to forest clearance—is approximately thirty to thirty-five times greater than the historical average, leading to the loss of 12 million hectares of land each year to drought and desertification. This has direct, negative implications for agricultural output and livelihoods, as the 12 million hectares of arable land lost annually could theoretically support 20 million tons of grain production.[15]

1.4 Water Regulation and Conservation

Forests also offer important ecosystem or 'watershed' services related to water provision and regulation. Healthy forest ecosystems can filter out water pollution, regulate stream flows, recharge aquifers, and absorb flooding. The ability of forests to provide these green infrastructure services can complement or substitute for 'gray' (i.e., built) infrastructure, in many cases providing these critical services for a fraction of the cost of installing and maintaining comparable 'gray' infrastructure. For example, reforesting hillsides can limit sedimentation in a hydropower station's reservoir — protecting the turbines from damage and prolonging the life of the reservoir — and also provide immediate, direct benefits for rural communities nearby in terms of soil retention, reduced flood risk, or enhanced groundwater recharge.

Other examples of watershed services provided by healthy forest landscapes include:

a) **Water for consumptive and non-consumptive human use:** Healthy forest ecosystems help ensure clean, reliable water for drinking, agriculture, hydropower generation, navigation, and other uses.

b) **Aquatic productivity:** Healthy aquatic habitats and the species that live in them are an important source of food and medicine. Yet water quality in coastal fisheries can be strongly affected by the condition of adjacent upstream watersheds and their forests, meaning that what happens on the mountain ridges — for better or worse — impacts the reefs.

[14] http://www.un.org/sustainabledevelopment/biodiversity/
[15] *Ibid.*

c) **Flow regulation and storm/flood buffering:** Healthy forests, wetlands, grasslands, and mangroves in some cases act as natural "sponges" that absorb water — recharging groundwater supplies, reducing flood risk, and/or maintaining stream flows during dry periods.

d) **Filtration of nutrients and contaminants:** Ecosystems, including forests and wetlands, improve water quality by trapping and filtering sediments and pollutants before they enter surface waters.

These watershed services provided by forests are particularly important in the context of growing freshwater scarcity worldwide. According to some estimates, by 2025 1.8 billion people will be living in regions with absolute water scarcity, and two-thirds of the world's population could experience water-stress conditions.[16] Already, about one-third of the world's largest cities obtain a significant portion of their drinking-water directly from forested protected areas, and this proportion increases to about 44% when including water sources originating in distant protected forested watersheds and other forests managed in a way that prioritizes their water-provisioning functions.[17] These linkages need to be better integrated into economic policy and planning, as the water storage services of forests can in many cases be significantly higher than the potential timber value of those forests.[18]

1.5 Recreation

For untold millennia, human societies have valued the aesthetic, recreational, and spiritual offerings of forest ecosystems. In many traditional cultures, stories of human origins are tied to specific forested areas, and forests are understood to have a unique life-force or creative power. While not all human communities frame this understanding within explicitly metaphysical language, virtually all societies with access to forests value their recreational services in some capacity—whether it be hiking, birdwatching, hunting, or simply taking in the scenic beauty offered by forests. These services provide a wealth of recreational enjoyment that is not easily quantified, but should nonetheless be valued. In formal economic terms, forests can generate recreational revenue through use- or entry-fees—in the case of parks or managed natural areas—and through the growing ecotourism sector.

1.6 Disaster Risk Reduction

Finally, forest ecosystems can play a crucial role in disaster risk reduction, acting as a natural buffer to prevent or mitigate natural disasters which threaten property and life. By absorbing rainfall and stabilizing land, intact forest ecosystems act to prevent flooding and landslides—which can be particularly deadly where forests have been cleared on hillsides above human settlements. Mangroves—a type of coastal forest ecosystem—play a critical role in weakening the power of storm surges in hurricanes and tropical storm events, limiting the extent of coastal flooding. This serves to reduce the risk of injury or death to

[16] Blumenfeld, S., Lu, C., Christophersen, T. and Coates, D. (2009). Water, Wetlands and Forests. A Review of Ecological, Economic and Policy Linkages. Secretariat of the Convention on Biological Diversity and Secretariat of the Ramsar Convention on Wetlands, Montreal and Gland. CBD Technical Series No. 47.

[17] Stolton, S., and Dudley, N. Managing forests for cleaner water for urban populations. Unasylva. FAO. 229. 40–1. As cited in *Ibid.*

[18] *op. cit.* Blumenfeld, S., Lu, C., Christophersen, T. and Coates, D. (2009).

coastal residents, and limits the severity of property damage that may have occurred had the mangrove forests not been present. Estimates suggest that natural disasters caused by anthropogenic ecosystem disruption already cost the world more than US$300 billion per year.[19] Protecting forests ecosystems will only become more important in limiting this damage and disruption as climate change, population growth, and land degradation act as threat multipliers—likely increasing the frequency and severity of natural disasters in years to come.

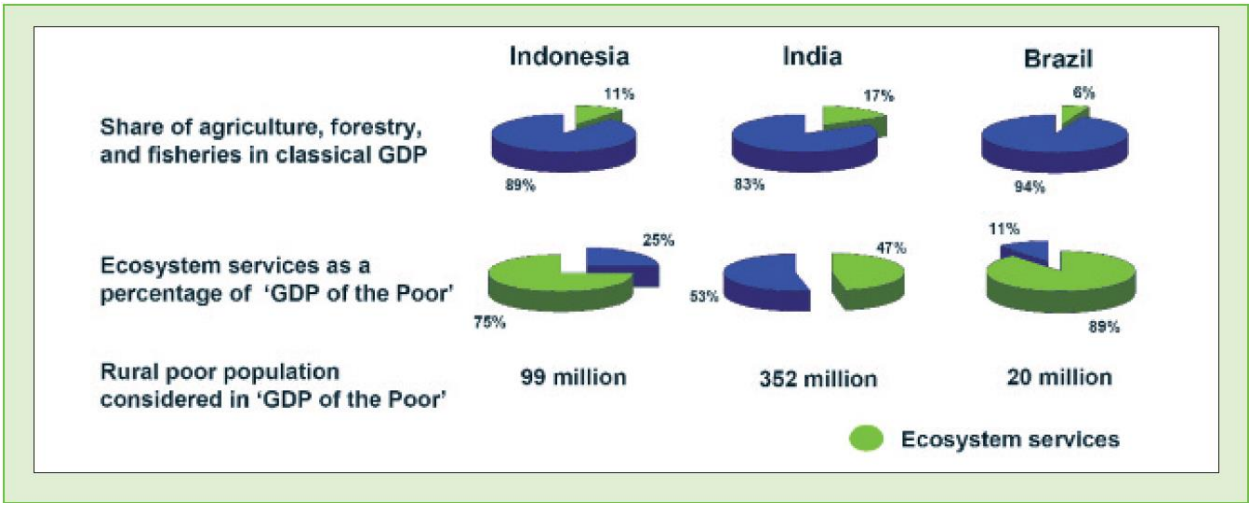
2. Interlinkages: Forest Ecosystem Services and Sustainable Development

2.1 Synergies

2.1.1 Poverty Eradication and Economic Development

Globally, more than 1.6 billion people depend on forests for their livelihoods. Of these, some 300 million to 350 million—half of whom are indigenous—live within or close to dense forests and depend almost entirely on forests for subsistence.[20] Billions more, including people in cities, depend on forest resources for food, traditional and modern medicines, construction materials, and energy sources. Studies suggest that ecosystem services and other non-marketed goods account for between 47% and 89% of the total source of livelihood for rural and forest-dwelling poor households.[21]

Figure 3. 'GDP of the Poor': Estimates for Ecosystem Service Dependence

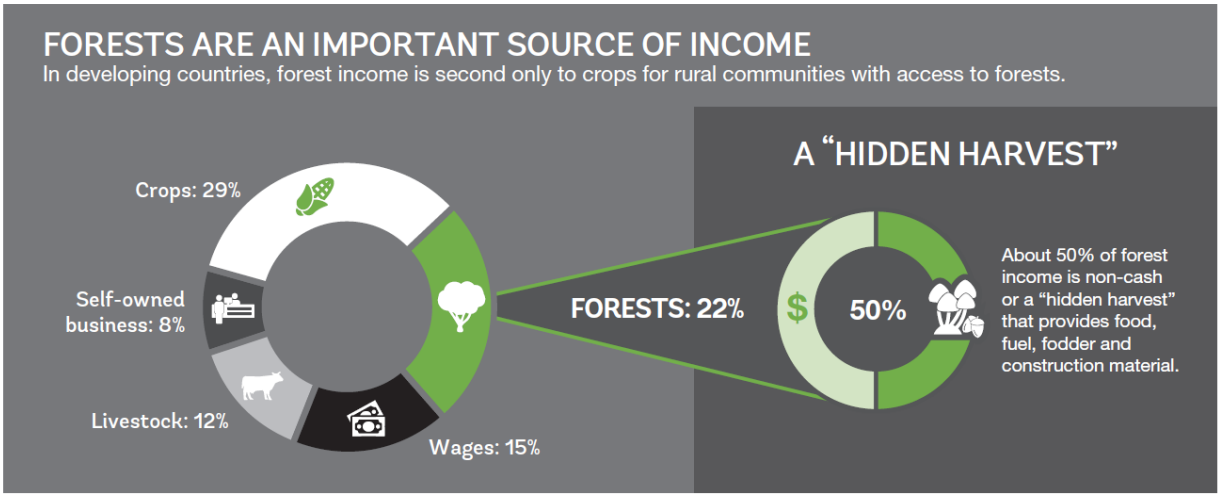


Source: TEEB, 2010. The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB.

[19] United Nations. 2017. "Goal 15 – Why It Matters," United Nations. Accessed November 13 2017. http://www.un.org/sustainabledevelopment/biodiversity/.
[20] Chao, S. 2012. Forest Peoples: Numbers across the World. Moreton-in-Marsh, U.K.: Forest Peoples Program. As cited in: World Bank, 2016. World Bank Group Forest Action Plan FY16–20. World Bank, Washington DC.
[21] TEEB (2010) The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB.

Rural households in Latin America, Africa, and Asia derive on average between 20 and 28 percent of their total incomes from forests.[22] Forest provide a greater share of income to these households than wage labor, livestock, self-owned businesses, or any other category aside from crop production. About half of this forest income is non-cash and includes food, fodder, energy, house-building materials, and medicine (see figure below). This noncash contribution, or "hidden harvest," is especially important for the extreme poor, given their limited access to markets.[23]

Figure 4. Forests: An Important Source of Income



Source: World Bank. 2016. "World Bank Group Forest Action Plan FY16–20." World Bank, Washington DC. License: Creative Commons Attribution CC BY 3.0 IGO

Forest resources enable people to rise out of extreme poverty and reduce vulnerability. An estimated 9 percent of the world's rural population is lifted above the extreme poverty line because of income from forest resources.[24] The impact of forests on poverty is greatest in the Africa region, with forest-related income lifting 11 percent of rural households out of extreme poverty. Additionally, forest income plays a particularly important role in diversifying the income sources of poor households, mitigating their vulnerability to events which may unexpectedly reduce their other income sources.[25]

2.1.2 Small and Medium Enterprises & Sustainable Production Forestry

Managing forests for sustainable timber production and harvesting offers an important opportunity to both secure forest ecosystem services, while also generating an income stream for forest users and managers. This can be a particularly powerful tool for economic development and poverty alleviation within the context of small and medium forest enterprises (SMFEs), which represent a significant portion

[22] CIFOR: Poverty and Environment Network. http://www.cifor.org/pen/pen-infographic/
[23] CIFOR: Poverty and Environment Network. As cited in: World Bank, 2016. World Bank Group Forest Action Plan FY16–20. World Bank, Washington DC.
[24] Extreme poverty is defined in the PEN study as US$1.25 per day in purchasing power parity terms.
[25] *Ibid.*

of the forest industry sector in many developing countries—often making up 80-90% of total enterprise numbers and more than 50% of forest-related jobs.[26] SMFEs offer important opportunities to promote non-farm employment in rural areas, including for women, and can be a means for accruing wealth locally, empowering local entrepreneurship, strengthening social networks, and engendering local social and environmental accountability.[27] And while there is little evidence that large-scale commercial sustainable wood production plays a substantial role in reducing poverty, SMFEs offer better prospects—especially when they work together in associations, which strengthen their bargaining power and allow them to offset scale disadvantages, cut costs, and use surpluses for strategic upgrading.[28]

2.1.3 Community Forestry Tenure Rights: Decentralizing Control to Local Communities

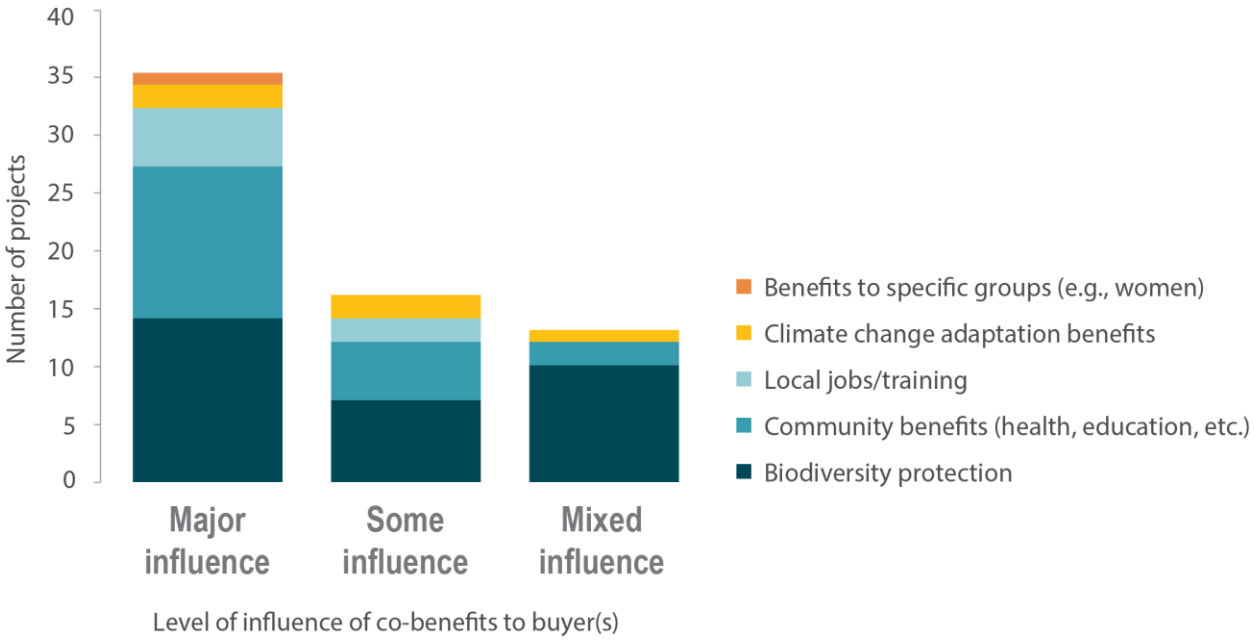
A wealth of research has demonstrated that empowering forest-based communities to exercise management control over their forest resources can generate significant social, economic, and environmental benefits for the communities themselves and for society as a whole.[29] Yet in many countries—particularly in the developing world—national governments hold title to the vast majority of forest lands, and the local communities best positioned to sustainably manage, protect, and conserve these forests are not given the legal authority to carry out this role. Formalizing land tenure and forest management rights for communities in the Global South represents a powerful opportunity for synergy in securing the continued provision of forest environmental services while also promoting the ability of communities to sustainably manage and use forests to promote their own economic development.

2.1.4 Wide-Ranging Community Benefits from REDD+ Forestry Emissions Reduction Projects

Forest Trends' Ecosystem Marketplace initiative collects extensive data on forest-carbon projects around the world, and recent research has found that the beyond-carbon impacts (co-benefits) of forest carbon projects, in particular biodiversity and community impacts, are often of equal or greater importance to buyers of the emissions reductions produced by these projects (Figure below). In fact, many project developers report that they could not deliver climate results without also addressing issues such as local economic development, poverty alleviation, and land tenure reform—testifying to the high degree of synergy between securing forest ecosystem services and promoting development benefits to communities. In 2014—the most recent year for which this data is available—just over 30% of the total $MtCO_2e$ transacted on the voluntary carbon markets were purchased "primarily" because of their co-benefits. This is a remarkable finding, given that the *raison d'être* of these markets is to allow buyers to purchase carbon offsets.

[26] Macqueen, D. (2008) Supporting small forest enterprises – A cross-sectoral review of best practice. IIED Small and Medium Forestry Enterprise Series No. 23. IIED, London, UK.
[27] World Bank, 2016. World Bank Group Forest Action Plan FY16–20. World Bank, Washington DC.
[28] *op. cit.* Macqueen, D. (2008).
[29] Stevens, C., R. Winterbottom, J. Springer, and K. Reytar. 2014. "Securing Rights, Combating Climate Change: How Strengthening Community Forest Rights Mitigates Climate Change." Washington, DC: World Resources Institute. Accessible at: www.wri.org/securing-rights.

Figure 5. Primary Co-Benefits that Motivated Forest Carbon Offset Buyers, by Project Count and Level of Motivation[30]



Source: Forest Trends' Ecosystem Marketplace, 2016. "Not So Niche: Co-benefits at the Intersection of Forest Carbon and Sustainable Development." Washington DC: Forest Trends.

2.2 Trade-offs

The principle trade-off involved in seeking to both safeguard forest ecosystem services and deliver sustainable development benefits to communities is driven by the reality that markets tend to place the highest and most consistent value on the ability of forests to provide timber—often to the exclusion of the various ecosystem services that standing forests provide. For forest-dependent communities in the developing world, this can create a trade-off scenario in which the economic and explicitly monetary benefits from timber harvesting must be balanced with the implicit and usually non-monetary value provided by forest ecosystem services. Harvesting too much timber in an unsustainable fashion can lead to forest degradation and the diminishment of the forest's ability to provide its full suite of ecosystem services. This trade-off becomes less acute as the various ecosystem services provided by forests are recognized and given value, allowing them to factor into decisions regarding timber harvesting vs. forest conservation.

3. Measuring and Accounting for Forest Ecosystem Services

Formally measuring and accounting for forest ecosystem services is a necessary first step toward properly valuing them, and various efforts toward this goal have been ongoing in recent decades at the global level. One of the earliest (1997) studies of ecosystem value at a global level estimated their total worth at $33 trillion per year, with forests making up a significant portion ($4.7 trillion) of this total.[31] More recently,

[30] Based on 63 projects reporting which co-benefit primarily influenced their buyers' decision to purchase offsets.
[31] R. Costanza et al., *The value of the world's ecosystem services and natural capital*. Nature, 387 (1997), pp. 253-260.

the Millennium Ecosystem Assessment conducted an examination of the state of forest ecosystem services worldwide, and concluded that the combined economic value of 'nonmarket' (social and ecological) forest services may exceed the recorded market value of timber—although these values are rarely taken into account in forest management decisions.[32] Similarly, research compiled by *The Economics of Ecosystems and Biodiversity (TEEB)* global initiative points out that in many cases the regulating services of tropical forests—such as carbon storage, erosion prevention, pollution control, and water purification—account for two-thirds of their total economic value, while the more traditionally-recognized sources of forest value such as timber, food, and genetic material together account for a relatively small share of overall forest value.[33] Yet despite the efforts made by these and other studies to assess the global value of forest ecosystem services, ongoing estimates face numerous challenges, most notably a lack of comprehensive and reliable ecological and economic data at the local and national scale.[34]

Furthermore, accounting and valuation exercises which seek to measure or quantify the theoretical economic value provided by forest ecosystem services to society do not necessarily translate into real value—in the form of actual payments, incentives, or compensation for the maintenance of these services. Forest Trends has been tracking the trajectory of real-market signals for forest ecosystem services for over a decade, in the form of payments for environmental services and investments in conservation. These findings constitute an important counterpoint to theoretical valuation studies by revealing the state and trends of actual monetary transfers and investments to support forest ecosystem service provision.[35]

3.1 Integration of Forest Ecosystem Services into National Accounting Systems, and Development Policies and Planning

At a practical level, in order for the value of forest ecosystem services to be properly understood and prioritized, systems must be established to measure, track, assess, and report on the status of these services, and an architecture must be created to integrate this information into national development policies and planning. At present, ecosystem service indicators are generally missing from standard monitoring and reporting frameworks of national and sub-national economic development policies and plans, meaning that ecosystem service impacts have the potential to be overlooked in planning and decision making. Mainstreaming a process to measure and assess ecosystem service indicators over time could enhance the recognition of their importance to society, and support a business case which attracts greater financial, human and technical resources for their development and regular update.[36]

[32] Millennium Ecosystem Assessment. Ecosystems and human well-being. Washington, DC: Island Press, 2005, p. 587. Accessed at: https://www.millenniumassessment.org/documents/document.290.aspx.pdf

[33] TEEB (2010) The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB.

[34] Millennium Ecosystem Assessment – Overview. https://www.millenniumassessment.org/en/About.html

[35] See for example two recent Forest Trends publications:

1) Hamrick, Kelley and Melissa Gallant, Forest Trends 2017. Fertile Ground: State of Forest Carbon Finance 2017. http://forest-trends.org/releases/p/sofcf2017
2) Forest Trends' Ecosystem Marketplace. State of Private Investment in Conservation 2016. Forest Trends, 2016. http://forest-trends.org/releases/p/sopic2016

[36] C., Reyers, B., Ingwall-King, L., Mapendembe, A., Nel, J., O'Farrell, P., Dixon, M. & Bowles-Newark, N. J. (2014).

Some countries have recently established policies seeking to integrate forest ecosystem services into national planning and development. For example, the United Kingdom's Woodland Carbon Code, launched in 2011, is a government-backed standard for promoting woodland planting by voluntary forest-carbon project developers seeking to quantify and account for the carbon dioxide sequestered by the plantings. By the end of 2016, 243 woodland creation projects had registered with the Woodland Carbon Code, together creating over 16,000 hectares of woodland which is predicted to sequester almost 6 $MtCO_2e$ over the projects' lifetime.[37] Similarly, Italy recently passed the 2015 *Environmental Act for the promotion of the green economy and the containment of natural resources use* (Law 221/2015, Art.70), which introduces a system of payments for ecosystem services directed to forest areas,[38] and Mexico has modified its federal law to allow a portion of municipal water charges to be distributed to landowners as payments for preserving forest land in watersheds identified as strategically important for aquifer recharge and maintenance of surface water quality.[39]

In addition, the government of Peru, with support from Forest Trends, established an Incubator for Ecosystem Services Projects in 2012, aimed at promoting effective investments for the restoration, conservation, and sustainable use of ecosystems and ecosystem services for watershed management and water provision. One of the Incubator's most important successes has been to identify and address barriers to investments in watershed services through national policy changes. This has included passage of a national 'Law on Compensation for Ecosystem Services' in 2014 that explicitly recognizes and endorses mechanisms to compensate land-users for ecosystem service provision, as well as supporting Peruvian water utilities to make investments in watershed services and green infrastructure—including through forest conservation and restoration. These investments are funded in part through a dedicated tariff on water utility bills, which generates revenue to be invested in natural infrastructure approaches to watershed management and delivery. At present, more than US$125 million in tariff fees has been earmarked for climate change adaptation and disaster risk management, US$30 million of which has already been set-aside for green infrastructure and payments to support watershed ecosystem services.[40]

Measuring ecosystem services: Guidance on developing ecosystem service indicators. UNEP-WCMC, Cambridge, UK.

[37] UK Forestry Commission. Woodland Carbon Code Statistics. www.forestry.gov.uk/forestry/infd-93yjte

[38] Hamrick, Kelley and Lucio Brotto. State of European Voluntary Carbon Markets. Forest Trends and ECOSTAR, 2017. Available at: http://www.forest-trends.org/documents/files/doc_5631.pdf#

[39] TEEB (2010). The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB.

[40] Sharing Nature's Benefits. Forest Trends' Incubator for Ecosystem Services Projects. Available at: http://forest-trends.org/documents/files/Peru_Incubator_Brochure.pdf

Figure 6: Rationale and Approaches for Valuing Ecosystem Services

Source: Forest Trends' Ecosystem Marketplace, 2016. "An Atlas of Ecosystem Markets in the United States." Washington DC: Forest Trends.

3.1.1 Natural Capital Accounting

One way to approach this is through a tool commonly referred to as 'natural capital accounting', which is a system for measuring the changes in stocks of forests and other natural capital at a variety of scales, and integrating the value of their ecosystem services into accounting and reporting systems. Under traditional accounting approaches, using GDP or profit/loss as the primary or sole indicator of national or corporate fiscal health, the full contribution of forests and the ecosystem services they provide are not accounted for or acknowledged—leading to a limited and potentially even misleading assessment of the full range of productive assets and overall economic health of a nation or a corporation. By contrast, natural capital accounting makes these implicit values and services provided by forests and ecosystems explicit, by assigning them a monetary value and incorporating them into economic assessment and planning.

Natural capital accounting can be undertaken by governments at the national or jurisdictional level, or by corporations within their supply chains or balance sheets. The European Commission is currently piloting a natural capital accounting approach, with the aim to create a policy decision-tool that explicitly accounts for ecosystem services and demonstrates in monetary terms the benefits of investing in their continued health and proper functioning.[41] In addition, natural capital accounting by corporations can complement government approaches, and lessons already being learned by leading

[41] http://ec.europa.eu/environment/nature/capital_accounting/index_en.htm

companies pursuing these accounting approaches can provide translatable lessons for governments to incorporate into their own efforts to better account for their forests and other natural capital.

3.1.2 National Policies and Plans

Ultimately, forest ecosystem services and the value they provide should be integrated into national development policies. In many developing countries, a logical place for this to occur would be within the context of Green Growth Plans, Low-Carbon Development Plans, and/or Sustainable Development Plans which are becoming increasingly common long-term planning tools for many national governments, and are often well-aligned with the Sustainable Development Goals. A core component of these economy-wide development plans are National Forest Management Plans, which focus specifically on the forest sector. According to the UN FAO, the majority of countries—167 in total, representing 98 percent of global forest area—have a forest management plan in place, and these plans together cover more than half of their total forest area, equivalent to about 2.1 billion hectares globally. Since 1990, the proportion of forest area under a management plan has increased in temperate, subtropical, and tropical regions, and it seems likely that the proportion of forest area covered by a management plan will continue to increase.[42] However, much work remains to increase the proportion of forest area under a management plan in tropical countries, to better integrate the value of forest ecosystem services into these plans, and to ensure that these plans play an active role in informing national policies and decision-making processes beyond the forest sector.

3.2 Accounting for Forest Ecosystem Services in the SDGs

In addition to the need for forest ecosystem service accounting and integration into national development policies and planning, a related need is to incorporate the valuation of these services into the metrics and indicators of the Sustainable Development Goals themselves, particularly those related to SDG 15: Life on Land.[43]

3.2.1 SDG Targets and Indicators

The United Nations Inter-Agency and Expert Group on Sustainable Development Goal Indicators recently finalized a set of targets and indicators for the seventeen SDGs, intended to delineate specific goals (targets) that would collectively lead to the overall achievement of each of the SDGs, as well as specific metrics (indicators) for each of these targets which could be used to assess progress over time. For SDG 15: Life on Land, a total of twelve targets have been identified, and each target has been assigned at least one indicator to track progress (see Table 1 below). The importance of conserving, restoring, and sustainably using forest ecosystem services is explicitly identified in Target 15.1.

[42] FAO (2015) Global Forest Resources Assessment 2015. Second Edition. The Food and Agriculture Organization of the United Nations. Rome, Italy.

[43] 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".

Table 2 demonstrates the potential contributions of various forest ecosystem services to each of the SDG15 targets, illustrating that the majority of the targets could be supported by one or more forest ecosystem services. However, the indicators identified to track progress toward the SDG15 targets in most cases do not explicitly call for or acknowledge the role of ecosystem services valuation and accounting as a tool to support achievement of the targets. Target 15.9 comes closest to calling for economic valuation of forest ecosystem services, but its associated indicator (15.9.1)—which is limited to biodiversity alone and does not mention ecosystem services—fails to advance this potential. Thus, on the whole the SDG15 targets and indicators appear to miss a key opportunity for advancing the integration of forest ecosystem service accounting into the SDG tracking and measurement framework.

Table 1: SDG 15 Targets and Indicators[44]

	Target	Indicator(s)
15.1	By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	15.1.1 Forest area as a proportion of total land area 15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type
15.2	By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	15.2.1 Progress towards sustainable forest management
15.3	By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world	15.3.1 Proportion of land that is degraded over total land area
15.4	By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development	15.4.1 Coverage by protected areas of important sites for mountain biodiversity 15.4.2 Mountain Green Cover Index
15.5	Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species	15.5.1 Red List Index
15.6	Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed	15.6.1 Number of countries that have adopted legislative, administrative and policy frameworks to ensure fair and equitable sharing of benefits
15.7	Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products	15.7.1 Proportion of traded wildlife that was poached or illicitly trafficked
15.8	By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species	15.8.1 Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species

[44] https://unstats.un.org/unsd/statcom/48th-session/documents/2017-2-IAEG-SDGs-E.pdf

15.9	By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts	15.9.1 Progress towards national targets established in accordance with Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011-2020
15.a	Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems	15.a.1 Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems
15.b	Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation	15.b.1 Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems
15.c	Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities	15.c.1 Proportion of traded wildlife that was poached or illicitly trafficked

Table 2: Potential Contribution of Various Forest Ecosystem Services to Specific SDG15 Targets

	Biodiversity Conservation	Climate Regulation	Soil Conservation	Water Conservation	Recreation	Disaster Risk Reduction
15.1	✓	✓	✓	✓	✓	✓
15.2	✓	✓	✓	✓	✓	✓
15.3		✓	✓	✓		
15.4	✓			✓		
15.5	✓					
15.6						
15.7	✓					
15.8	✓					
15.9	✓	✓	✓	✓	✓	✓

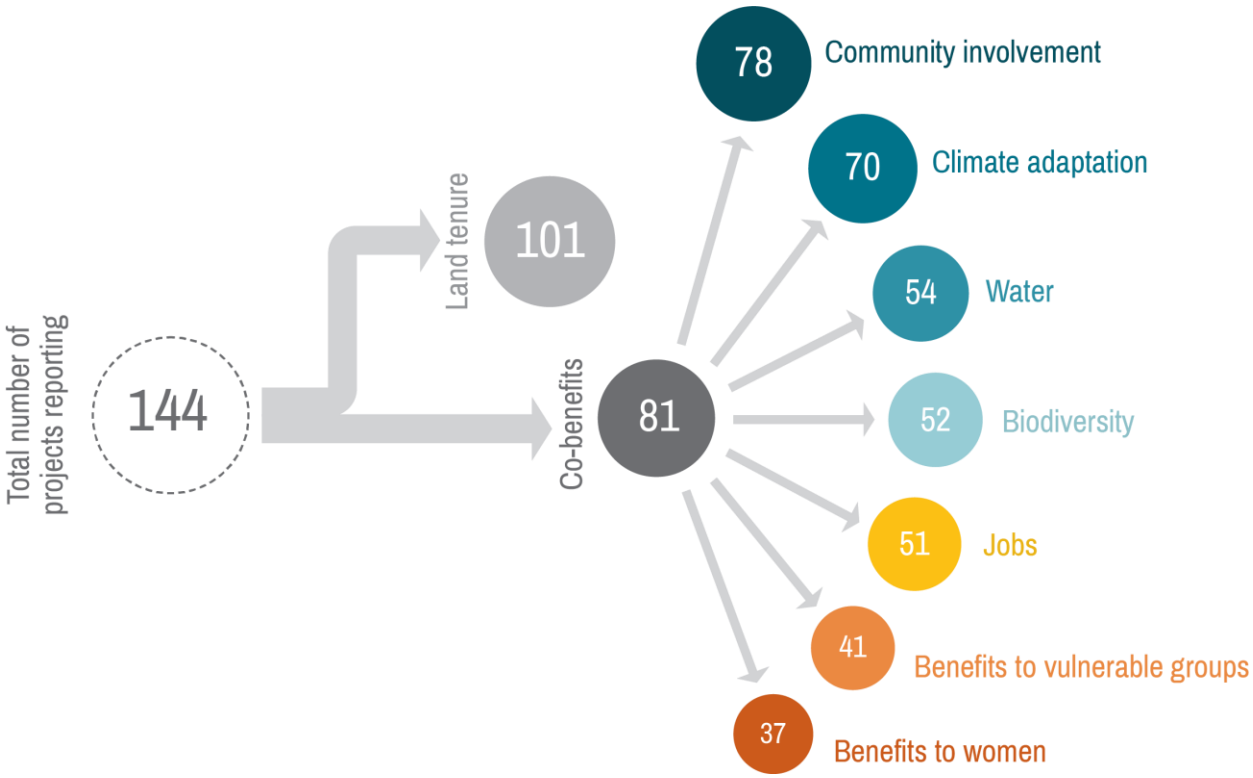
3.2.2 Borrowing Lessons from Forest Carbon Projects & Standards: Measuring and Reporting on Forest Ecosystem Services

One way in which forest ecosystem services accounting could be more comprehensively integrated into SDG tracking would be to borrow from the extensive lessons learned over the past decade within the world of forest carbon project development—including project developers and third-party standard and certification bodies, within both voluntary and compliance carbon markets. Third-party carbon standards offer frameworks for designing emissions reduction projects and for measuring, reporting,

and verifying project emissions reductions over time. Co-benefits standards have also emerged to measure and verify benefits to people and ecosystems, such as the Climate, Community & Biodiversity (CCB) Standards, the Gold Standard, and Plan Vivo standards. In addition to carbon sequestration, these standards measure impacts related to biodiversity conservation, watershed protection, climate resilience, securing land tenure and carbon ownership, and providing jobs and training to local communities—particularly women and marginalized groups.

Though third-party standards offer frameworks for measuring and reporting on co-benefits, the specific indicators tracked are often left up to project developers, making it difficult to compare impacts across projects. Metrics for certain co-benefits are fairly consistent: many project developers keep track of the number of people they employ, the number of hectares of High Conservation Value (HCV) land they protect, or the endangered species present they've spotted in the project area. Other metrics are much less obvious. For instance, project developers report on "climate resilience" benefits in a wide variety of ways, citing things like enhanced food security, forest fire management, increased community incomes, and erosion control. A recent survey of forest carbon and land-use project developers conducted by Forest Trends' Ecosystem Marketplace finds ample evidence that project developers are tracking a wide range of impacts, or co-benefits, achieved in conjunction with their forest carbon sequestration projects. Of the 144 projects that reported to the survey, 81 (56%) answered at least a portion of the survey's questions on co-benefits, with many reporting key benefits provided by forest ecosystem services (see figure below).

Figure 7: Co-Benefits Reported by Voluntary Forest Carbon Market Projects



Source: Forest Trends' Ecosystem Marketplace, 2016. "Not So Niche: Co-benefits at the Intersection of Forest Carbon and Sustainable Development." Washington DC: Forest Trends.

Furthermore, many carbon offset standards are already developing ways to integrate their co-benefits reporting with the Sustainable Development Goals. The Gold Standard, for example, has launched a new standard focused on quantifying, certifying, and maximizing impact toward SDGs. The Voluntary Carbon Standard (VCS) has similarly announced an intention to do so, while other organizations have started certifying projects based on their contributions to goals such as gender equality.

There is great potential for forest carbon project tracking and reporting to inform assessments of progress toward specific SDG goals, targets, and indicators. For example, suggested SDG indicators include 'area of forest under sustainable management' (Goal 15, Life on Land), 'amount of finance flowing to developing countries for mitigation activities' (Goal 13, Climate Action) and 'the share of women among agricultural landowners' (Goal 5, Gender Equality) – metrics that some forest carbon projects already track. See the Annex I for examples of how metrics that forest carbon projects are currently tracking could align with the SDGs.

3.3 Forest Monitoring Tools and Systems

3.3.1 Satellite and Remote Sensing

Over the past decade, rapid developments in technology have opened up new possibilities for monitoring changes in forest cover, with a degree of accuracy, accessibility, and cost-effectiveness that is constantly and rapidly improving. Satellite technology now allows for real-time monitoring of forests all over the globe. At the international level, one of the platforms for tracking forest cover change is Global Forest Watch, an initiative of numerous partners convened by the World Resources Institute.[45] The platform draws upon satellite and cloud-computing technology to allow users to monitor forest cover change in forests all over the world. This technology is being used by a wide range of stakeholders, including government officials charged with safeguarding forests from illegal logging or clearance in protected areas, by corporations seeking to verify the legality and deforestation-free nature of their timber and agricultural commodity purchases, by civil society actors seeking to protect forests, and by journalists aiming to shed light on deforestation hotspots around the world.

At the national level, capacity-building and technology-sharing efforts have made great strides in enabling countries all over the world to more effectively monitor the state of their forests, using satellite and remote sensing technology. Much of the impetus for these efforts has been driven by countries seeking to prepare for participation in the United Nation's Reducing Emissions from Deforestation and Degradation (REDD+) framework, which would facilitate the provision of finance to developing countries for measurable and demonstrable achievements in avoided deforestation. In upper-middle-income countries such as Brazil, funding to develop and utilize national forest monitoring systems has come primarily from national governments themselves, with the expectation that investments in forest monitoring capability will not only enable more effective enforcement of national forestry laws, but also provide a foundation for quantifying and demonstrating avoided deforestation and associated emissions

[45] http://www.globalforestwatch.org/about

reductions, which would theoretically be eligible for REDD+ payments. In the context of lower-income countries—which collectively contain much of the world's tropical forests—finance and technical support to enable the development of cutting-edge forest monitoring systems has come in large part from international donors, under the umbrella of REDD+ Readiness Finance. This finance and technical support has achieved significant forward progress in the ability of even low-income countries to monitor their forest cover change in real-time. These technological investments provide a strong foundation for countries to measure and account for the positive of role of forest ecosystem services, and to enable effective forest monitoring and management which preserves these ecosystem services over time.

3.3.2 Ensuring Legality – Traceability, FLEGT, and Forest Certification

One of the greatest threats to forests worldwide is the widespread presence of illegal logging. Recent studies estimate illegal logging to account for 50-90% of the volume of all wood production in key tropical producer countries and 15-30% globally.[46] Meanwhile, the economic value of global illegal logging, including processing, is estimated to be worth US$30-100 billion, or 10-30% of the global wood trade.[47] Furthermore, estimates indicate that the availability of illegal timber supply depresses market prices by 7–16 %.[48] In this context, a variety of tools and approaches have emerged to monitor and ensure the legality of forest management and timber harvesting.

New technologies are available and emerging that can be used to enhance information and monitoring of forests and forest product harvesting, transportation, and sale to support legality. Technological changes have led to advances in earth observation systems and declining costs in mobile devices, together making information much more affordable and accessible. Many opportunities exist to use information and communication technologies (ICT) to improve forest monitoring and management, including wood product tracking and traceability, chains of custody, and forest cover monitoring systems. The use of ICT can significantly improve transparency and accountability, and reduce opportunities for illegal deforestation.[49]

One important policy response to the risks posed by illegal logging has been an approach developed by the European Union, called the Forest Law Enforcement, Governance and Trade initiative (FLEGT). The FLEGT framework provides a forum for negotiation between the EU and timber-supplying countries to jointly develop a definition of timber legality, and to develop a Timber Legality Assurance System (TLAS) which governs the harvesting of all timber in the country. Once approved, a legally binding trade agreement is established in the form of a Voluntary Partnership Agreement (VPA), facilitating the flow of legality-verified timber from the exporting country to the EU. The FLEGT system represents an important tool for forest monitoring and sustainable forest management, by reducing the ability of illegally-harvested timber to be traded on the international market.

Finally, forest certification is an additional tool to support forest monitoring and legality. A voluntary, market-based instrument, forest certification has helped increase awareness of the need to define

[46] INTERPOL / The World Bank. 2009. Chainsaw Project: An INTERPOL perspective on law enforcement in illegal logging. 57 pp.
[47] Nellemann, C. 2012. Green Carbon, Black Trade: Illegal Logging, Tax Fraud and Laundering in the Worlds Tropical Forests. INTERPOL. 72 pp.
[48] World Bank. 2016. "World Bank Group Forest Action Plan FY16–20." World Bank, Washington DC. License: Creative Commons Attribution CC BY 3.0 IGO
[49] *Ibid.*

standards for good forest management, and has been promoted by many non-governmental organizations and private-sector companies involved in forest product harvesting. Although certification has been most successful in temperate and boreal forests—in 2014, more than 90% of all certified forests were in those biomes—it has also been important in promoting the concept of sustainable forest management in natural tropical forests. The area under international forest management certification schemes increased from 14 million ha in 2000 to 438 million ha in 2014, of which 58 percent was under the Program for the Endorsement of Forest Certification (PEFC) scheme and 42 percent was under the Forest Stewardship Council (FSC) certification scheme.[50]

3.3.3 Tracking Corporate 'Zero-Deforestation' Commitments

A major driver of deforestation globally, coming from outside the forest, is rapidly growing demand for commodity agriculture production, much of which is subsequently purchased and processed by major global agro-commodity companies and/or consumer products corporations. Between 2000 and 2012, commercial agriculture accounted for an estimated 71% of global tropical deforestation, while illegal agro-conversion was responsible for 24% of tropical forest loss.[51] In response to consumer and civil society pressure, many companies are making commitments to reduce deforestation in their supply chains, and to track their progress toward achievement of this goal. As of March 2017, according to research conducted by Forest Trends' Supply Change Initiative, 460 companies globally have made commitments to curb forest destruction in supply chains linked to palm oil, soy, wood products and pulp, and cattle.[52] These commitments take a variety of forms, including targets related to purchasing verified legal and/or certified products, supply chain traceability, moratoria on areas or suppliers linked to deforestation, and other targets for low- or zero-deforestation. Many of these commitments also include a wide range of additional attributes and criteria, such as protection of indigenous people and vulnerable communities, protection of local tenure and resource use, and use of free and prior informed consent (FPIC) for access and use of local forest resources. These corporate commitments, and the civil society initiatives tracking their progress, are crucial tools for monitoring and valuing forests and the ecosystem services they provide.

4. Integrating Forest Ecosystem Services into Policies and Financing Strategies

4.1 Policy Instruments

The incorporation of forest ecosystem services into international, national, and subnational government policies and plans is already occurring in a number of different forms. While these efforts are still nascent and require significant political will to adequately scale-up and take full effect, they nonetheless provide a useful foundation upon which further progress can be made.

[50] ITTO (2015). Voluntary guidelines for the sustainable management of natural tropical forests. ITTO Policy Development Series No. 20. International Tropical Timber Organization, Yokohama, Japan.
[51] Lawson, S. 2014. Consumer goods and deforestation: An analysis of the extent and nature of illegality in forest conversion for agriculture and timber plantations. Retrieved from: http://www.forest-trends.org/documents/files/doc_4718.pdf
[52] Forest Trends, 2017. Supply Change: Tracking Corporate Commitments to Deforestation-Free Supply Chains, 2017. Available at: http://forest-trends.org/releases/p/supply_change_2017

4.1.1 International Level – UNFF and the Forest Instrument, UNFCCC and the Paris Agreement

At the international level, the United Nations Forum on Forests and its related policy instruments—the UN Forest Instrument and the UN Strategic Plan for Forests 2017-2030—serve as important policy documents for integrating forest ecosystem services into international and national policies and plans. The United Nations Forest Instrument provides a framework for national actions and international cooperation to sustainably manage forests, containing 25 national policies and measures and 19 international measures.[53] The UN Strategic Plan for Forests 2017-2030 provides a global framework for sustainably managing all types of forests and trees outside of forests, halting and reversing deforestation and forest degradation, and increasing forest area.[54] It seeks to encompass and engage partners and stakeholders at all levels, and highlights their respective roles and responsibilities in the implementation of the plan. Both policy instruments explicitly call for forest ecosystem services to be more fully recognized and accounted for in the context of international and national policy and decision making.

Additionally, the Paris Agreement adopted at the 2015 United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP21) formally and officially recognizes forests as a critical piece of the global effort to combat climate change, and acknowledges the vital role that forest ecosystem services must play in generating meaningful climate action. Reducing emissions from deforestation and degradation, known as REDD+, is included in Article 5 of the Agreement, with reference to the role of sustainable forest management—including forest restoration and conservation. This achievement finalized a decade of negotiations on REDD+ within the UNFCCC, and provides a policy architecture for scaled-up results-based REDD+ payments from developed to developing countries in the years ahead.

Furthermore, Article 6 of the Agreement establishes the role for internationally transferred mitigation outcomes (ITMOs) in a voluntary manner between countries, with an eye towards promoting sustainable development while enhancing emission reduction achievements. Taken together, Articles 5 and 6 of the Agreement pave the way for REDD+ finance to both recognize and reward the value of forest ecosystem services, and to promote sustainable, forest-friendly development in tropical forest countries. The inclusion of REDD+ in the Paris Agreement is already having positive impacts and influence on other international processes to channel climate finance, including enabling the Green Climate Fund to begin awarding funding for REDD+ programs, and catalyzing discussions surrounding potential inclusion of REDD+ within the International Civil Aviation Organization's (ICAO) Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).

Finally, beyond the UNFF and UNFCCC, the Convention on Biological Diversity's Aichi Biodiversity Targets explicitly call for enhancing the benefits to all from biodiversity and ecosystem services,[55] and the Global Environment Facility's sustainable forest management strategy aims to maintain existing forest ecosystem services and reverse the loss of forest ecosystem service provision within degraded forest landscapes.[56] The central inclusion of forest ecosystem services within each of these international policy and guidance documents signals the growing global recognition that forest ecosystem services can serve

[53] http://www.un.org/esa/forests/documents/un-forest-instrument/index.html
[54] http://www.un.org/esa/forests/documents/un-strategic-plan-for-forests-2030/index.html
[55] As specified within Targets 14-16 of its Strategic Goal D. See: https://www.cbd.int/sp/targets/
[56] https://www.thegef.org/topics/sustainable-forest-management

as a powerful framework for understanding and valuing the economic, social, and ecological contributions of forests to society.

4.1.2 National Level – Domestic Policy and National Contributions to International Agreements

At the national level, examples abound of governments formulating national policies to prioritize or incentivize forest conservation and/or restoration, in recognition of the ecosystem services that forests provide. These policies can take many different forms depending on the specific country context. As one recent and innovative illustration, India's central government announced in early 2015 that it would redistribute tax revenues to states based partly upon changes in forest cover, with more funding going to states that maintain or increase their total forest area.[57] These sorts of policies effectively integrate the valuation of forest ecosystem services into mainstream government planning and decision-making, by tying concrete economic value to forest conservation.

In many cases, the impetus behind the creation and formalization of these national policies is the desire by governments to submit national contributions in support of various international agreements. Two prime examples of such international agreements are the UN Strategic Plan for Forests (UNSPF) and the UNFCCC Paris Agreement. In the context of the UNSPF, countries are encouraged to formulate their plans for achieving the Global Forest Goals and targets of the UNSPF and to communicate these plans to the UN Forum on Forests in the form of Voluntary National Contributions (VNCs). Member States are encouraged to announce their initial VNCs at the thirteenth session of the UNFF (UNFF13, 7-11 May 2018). In the context of the Paris Agreement, these national commitments take the form of Nationally Determined Contributions (NDCs)—or country-specific climate goals and plans—which virtually every country of the world submitted in the lead-up to the Paris negotiations. These NDCs lay out each country's specific greenhouse gas reduction targets, either from a historical baseline or a forward-looking, business-as-usual projected estimate. The forest sector figured largely in these commitments, with more than 90 countries committing within their NDC submissions to limit forest loss and/or increase forest cover.[58]

The creation of forest-related national contributions to the UNFF and UNFCCC achieves multiple purposes. At the international level, the aggregation of these commitments is intended to have a global, cumulative impact that can only be achieved through collective action. At the national level, these national contributions play an important role in shaping policy and planning in forest countries throughout the world. In many countries, the process of formulating these commitments constitutes an important venue for coordinated national planning around forests which may not otherwise occur with a similar level of cross-governmental collaboration. These national contributions, and the forest conservation commitments they include, can represent important policy instruments for integrating forest ecosystem service values into national decision-making and development planning processes, with the potential to create positive impacts for forest management outcomes in these countries for years to come.

[57] Busch, Jonah. February, 2015. India's Big Climate Move. Center for Global Development. https://www.cgdev.org/blog/indias-big-climate-move

[58] World Bank. 2016. "World Bank Group Forest Action Plan FY16–20." World Bank, Washington DC. License: Creative Commons Attribution CC BY 3.0 IGO

4.1.3 Government Regulation

One of the most powerful policy tools for acknowledging and safeguarding the value of forest ecosystem services is through direct government regulation, which can occur at the national and/or the subnational level. Regulations requiring a minimum standard of environmental performance—with regard to carbon sequestration, biodiversity conservation, water quality maintenance, or any number of other objectives and metrics—can mandate the conservation of forests and the ecosystem services they provide. In many cases, these regulations are structured with a degree of flexibility which allows environmental damage in one location to be offset by sufficient remediation in a different location. In the context of biodiversity conservation, this can take the form of biodiversity offsets, which in many cases involve the conservation or restoration of forest habitat to be undertaken as compensation for infrastructure or development projects that have an adverse impact on existing forest habitat for a species of concern. With regard to regulations limiting carbon emissions—such as cap-and-trade policies—in many cases conserving threatened forest as a means to offset industrial or other sources of emissions can offer a cost-effective alternative for regulatory compliance. In these and other contexts, government regulations mandating a minimum standard of environmental performance can stimulate the formation of ecosystem service markets—which can be an important source of finance for conserving forests and the ecosystem services they provide.

As a recent example of innovative government regulatory policy, Forest Trends' Ecosystem Services Project Incubator initiative supported the government of Peru to establish a ground-breaking national payments for ecosystem services law in 2014, which provides the legal signal needed for public investment to flow toward payments for ecosystem services aimed at achieving watershed conservation. In Peru, over US$30 million has already been set aside for PES mechanisms to help secure water supply for Peruvian cities by investing in watershed conservation and the new regulation provides the legal clarity that will allow these funds to reach effective projects on the ground.[59]

4.2 Payments for Forest Ecosystem Services – Including REDD+

The provision of finance to properly and sufficiently value forest ecosystem services is imperative if global efforts to preserve forests and safeguard their numerous contributions to sustainable development are to succeed. According to estimates from the United Nations Forum on Forests, the required financing for sustainable forest management is between US$70 and US$160 billion per year globally.[60] At present, official development assistance disbursements to sustainable forest management cover about 1 percent of the estimated total financing needs, and other available public sector financing

[59] Michael Jenkins, Gena Gammie and Jan Cassin, 2016. Peru Approves New Innovative Environmental Policies. Available at: http://forest-trends.org/blog/2016/07/27/peru-approves-new-innovative-environmental-policies/

[60] UNFF AGF (Advisory Group on Finance). 2012. 2012 Forest Financing Study. Collaborative Partnership on Forests. Available at: http://www.un.org/esa/forests/pdf/yearGF_Study_July_2012.pdf.

sources barely double that amount.[61] At the same time, existing private financial flows to the sustainable forest management sector are estimated to be as high as $15 billion per year.[62]

Taken together, the current scale of global finance for sustainable forest management does not begin to approach the estimates of what is needed. As such, greater levels of capital investments must be generated. One promising approach is through payments for forest ecosystem services, which are primarily occurring through four main categories, including: the provision of public REDD+ finance; voluntary and compliance market payments for forest carbon; private investments in sustainable forest management; and blended public-private forestry investments.

4.2.1 Public Finance

The vast majority of funding provided over the past decade for forest conservation and sustainable forest management (REDD+) in developing countries has come from the public sector—namely donor governments, primarily in the form of concessional grants and loans categorized as official development assistance or aid. Approximately US$10 billion in REDD+ readiness finance was pledged between 2006 and 2014, with 90% coming from the public sector.[63] Forest Trends' REDD+ Expenditures Tracking Initiative (REDD*X*) tracked more than US$6 billion of this finance pledged to 13 countries between 2009 and 2014, and found that two-thirds of this funding had been committed to just two countries—Brazil and Indonesia.[64] While much of the public REDD+ finance pledged has been in the form of unrestricted grants and concessional loans, a significant and growing portion of REDD+ pledges are being made in the form of performance-based payments, which tie funding to the achievement of specific forest conservation outcomes. As of 2015, the REDD*X* Initiative had tracked more than US$3.5 billion in public finance pledged to REDD+ countries as performance-based payments since 2008.[65] In many ways, this finance functions as a sort of payment for forest ecosystem services—even though in the case of REDD+ readiness finance, no carbon offsets are traded or exchanged. However, under market-based REDD+, which the Paris Agreement theoretically envisions, countries with industrialized economies may eventually begin paying developing countries for REDD+ offsets. These types of transactions may hold the key to generating significantly higher levels of public sector finance for forest ecosystem services in the years to come.

[61] PROFOR (2014b) Private Financing for Sustainable Forest Management and Forest Products in Developing Countries—Trends and Drivers. Washington, DC: Program on Forests (PROFOR).
[62] Asen, A., H. Savenije, and F. Schmidt, eds. 2012. Good Businesses: Making Private Investments Work for Tropical Forests. Wageningen, Netherlands: Tropenbos International. As cited in: World Bank. 2016. "World Bank Group Forest Action Plan FY16–20." World Bank, Washington DC. License: Creative Commons Attribution CC BY 3.0 IGO
[63] Norman, Marigold, and Smita Nakhooda. 2014. "The State of REDD+ Finance." CGD Working Paper 378. Washington, DC: Center for Global Development. http://www.cgdev.org/publication/state-redd-finance-working-paper-378
[64] Silva–Chávez, Gustavo, Brian Schaap, and Jessica Breitfeller. 2015. "REDD+ Finance Flows 2009–2014: Trends and Lessons Learned in 10 REDD*X* Countries." http://www.forest-trends.org/documents/files/doc_5029.pdf.
[65] *Ibid.*

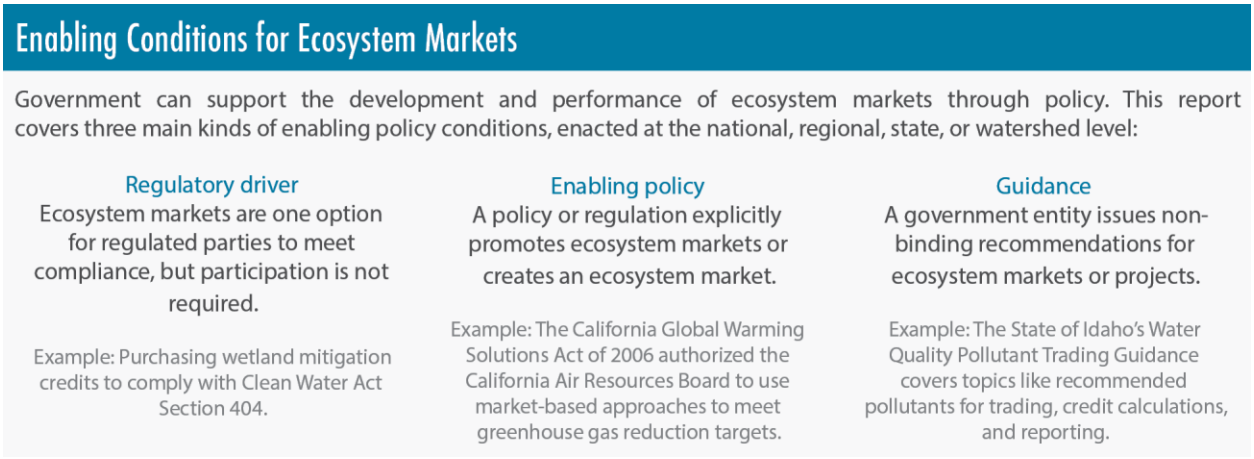
4.2.2 Ecosystem Markets

Another approach to safeguarding forest ecosystem services is through incentive mechanisms for conservation, including voluntary and compliance markets. Ecosystem market mechanisms and payments for ecosystem services range from simple contracts between a buyer and seller to sophisticated markets for environmental credits or other assets representing delivery of an ecosystem service. Market mechanisms to restore, enhance, or maintain ecosystem services transact an estimated US$15.9 billion globally each year, according to tracking of biodiversity, water, and forest carbon markets by Forest Trends' Ecosystem Marketplace. A significant share of this value flows to projects that protect and/or enhance ecosystem services from forested lands: ecosystem markets support management and conservation of at least 29.8 million ha of forests annually worldwide.

While the term 'market' suggests a global exchange with common trading rules, units of exchange, and pricing responsive to the forces of supply and demand, in reality some segments are more 'market-like' than others. Carbon offset markets for example have developed common trading infrastructure (such as registries), a standard currency (offsets representing one tCO_2e), widely-accepted standards for developing offsets, market-determined pricing, and a thriving secondary market of brokers and retailers intermediating between project developers and end-buyers of offsets. Market mechanisms for watershed protection, in contrast, are typically small-scale, ad-hoc deals between a small number of parties exchanging funding for often poorly-defined and un-verified ecosystem services.

Yet all of these mechanisms share a common framework, in that they focus on one or more parties restoring or maintaining valuable ecosystems and the services they deliver to society in exchange for financial compensation. Variety in sophistication of infrastructure, methodologies for defining and certifying outcomes, market participants, and their motivations arises from the still-nascent nature of these mechanisms. With every new policy or regulatory driver (e.g., the Paris climate agreement), advance in technology (e.g., remote sensing), and larger societal trend (e.g., water stewardship), ecosystem markets respond with new innovations and offerings. This means new opportunities for market share or influence are continually emerging, as participants try to devise new and innovative ways to harness the power of markets to value forest ecosystem services.

Figure 8: What Are Ecosystem Markets?



Source: Forest Trends' Ecosystem Marketplace, 2016. "An Atlas of Ecosystem Markets in the United States." Washington DC: Forest Trends.

4.2.3 Private Investment

In addition to public finance and finance provided through ecosystem markets, private sector investments in sustainable forest management and forest ecosystem services represent an important source of capital. Much of this investment in the developing world is in the form of forestry plantations, often targeted for lands that have been degraded or previously deforested. By 2011, an estimated US$1.8 billion in large-scale private investments in forest plantations had been made in developing countries—with the majority of these in Latin America.[66] While these private investments are focused primarily on plantation timber production, in cases where sustainable production is prioritized—demonstrated by certification standards such as FSC—these plantation forests can nonetheless provide a range of forest ecosystem services that may not have existed on the degraded or deforested lands that existed prior to plantation establishment. Recent research by Forest Trends documents a significant increase in recent years in private sector sustainable forest management investments. A survey of private investors identified US$8.2 billion in private investments made between 2004 and 2015 that seek measurable environmental outcomes, with the largest segment of these (US$ 6.5 billion) in the category of sustainable food and fiber, most of which is in sustainable forest management.[67]

4.2.4 Blended Finance

With ambitious global goals for forest conservation and emerging clarity on the amount of investment required to achieve these goals, emphasis is growing on the crucial role that blended public-private finance can play in helping to drive these investments. The World Economic Forum (WEF) defines blended finance as "the strategic use of development finance and philanthropic funds to mobilize private capital flows to emerging and frontier markets, resulting in positive results for both investors

[66] World Bank (2017) Harnessing the Potential of Productive Forests and Timber Supply Chains for Climate Change Mitigation and Green Growth: Opportunities for Private Sector Engagement. World Bank, Washington DC.
[67] Forest Trends, (December 2016). Forest Trend's Ecosystem Market Place "State of Private Investment in Conservation 2016". http://www.foresttrends.org/documents/files/doc_5474.pdf#

and communities."[68] Blended finance can be used to mitigate risk for financial investors, to demonstrate new business models, and to generate financial returns from activities and impacts related to sustainable forest management that are not typically monetized, such as positive environmental and social outcomes.

The key to blended finance is not just financial structures or 'stacking' of different types of public and private capital, but the commingling of expertise and objectives between the public and private sector in a way that provides more and better financial returns and social/environmental outcomes than can be achieved through public or private investment alone. In sustainable forest management investments, blended finance may increase investments into emerging and frontier regions as well as into landscape management, conservation and restoration – activities that typically come at a cost to businesses but that deliver positive environmental and social impacts, and which are important components of forest ecosystem service provision. Ultimately, blended finance should be a tool that can either increase the amount of investment into sustainable forest management or amplify the potential positive social or environmental impacts of these investments.[69] In either case, blended finance will be a critical tool in mobilizing the finance needed to secure forest ecosystem services and to achieve SDG 15.

5. Conclusions and Recommendations: Successes and Recent Developments for Forest-Based Solutions to Accelerate the Progress Towards Achievement of SDG15

5.1 Conclusions

Despite the continuation of forest loss worldwide and the significant challenges facing efforts to safeguard forests and the ecosystem services they provide for sustainable development, the global community appears to be arriving at an important turning point with a number of recent developments pointing to a positive trajectory of progress. These developments include:

5.1.1 New Policy Signals

- Policy drivers such as the Sustainable Development Goals and the Paris Agreement—with their explicit acknowledgement of the role that forests must play in achieving global development and climate change mitigation goals—send a powerful political signal that the global community is committed to forest conservation, and offer pathways for the provision of finance to facilitate this objective.
- National and regional-level governments around the world are incorporating forest carbon into their carbon pricing programs, with 13 countries (representing nearly every region of the world) having some form of government-facilitated program for trading forestry and land-use carbon offsets.[70]
- Global and national commitments for Forest Landscape Restoration are on the rise, driven in large part by the Bonn Challenge and its goal to restore 150 million hectares of degraded and deforested

[68] The World Economic Forum and the OECD, (January 2016). Insights from Blended Finance Investment Vehicles & Facilities. http://www3.weforum.org/docs/WEF_Blended_Finance_Insights_Investments_Vehicles_Facilities_report_2016.pdf.
[69] New Forests (2017). Timberland Investment Outlook — 2017. New Forests Asset Management Pty Ltd. Sydney, Australia.
[70] Hamrick, Kelley and Melissa Gallant, Forest Trends (2017). Fertile Ground: State of Forest Carbon Finance 2017. http://www.forest-trends.org/documents/files/doc_5715.pdf#

land by 2020, and 350 million hectares by 2030. At present, 160.2 million hectares have already been pledged for restoration, and achieving the 350 million hectare goal is expected to generate about US$170 billion per year in net forest ecosystem service benefits in the form of watershed protection, improved crop yields, enhanced provision of forest products, and sequestration of up to 1.7 gigatonnes of carbon dioxide equivalent annually.[71]

- The global community—including governments, donors, the private sector, and investors—are increasingly recognizing that secure land rights are a critical tool for achieving sustainable development and forest conservation goals. Recognition of indigenous and community forest ownership rights has risen from 21 percent of total forest area in 2002 to 30 percent by 2015.[72] Yet despite this overall gain in the devolution of forest tenure rights to communities, progress at further recognition of community rights has slowed since 2008, signaling the need for continuing concerted action to ensure that communities living in and among forests are given proper legal recognition of their tenure rights.[73] An encouraging development is the recent launch of a new global tenure facility, supported by the Rights and Resources Initiative, to channel finance for community land tenure formalization.[74]

5.1.2 Growing Investments: Public, Private, and Blended Finance

- The Green Climate Fund is poised to be a major new source of public REDD+ finance, having pledged $500M in October 2017 to pay for REDD+ offsets. The fund is now seeking applications from countries that have active REDD+ programs and have successfully avoided deforestation between 2014 and 2019.[75]
- The World Bank's Forest Carbon Partnership Facility—one of the largest public-sector REDD+ financing programs globally—is moving closer to formally contracting offsets from its member supply countries. The fund has officially selected Chile, the Democratic Republic of Congo and Ghana into its portfolio and provisionally selected Costa Rica, Mexico and the Republic of Congo.[76]
- Nearly US$1 billion in voluntary forest carbon market offset transactions have been reported since Forest Trends' Ecosystem Marketplace first started collecting this data in 2009. This finance has provided both climate and community benefits—including employment and training for local communities as well as the provision of community services—and testifies to the potential for forest conservation efforts to meet multiple environmental and sustainable development objectives.[77]

[71] http://www.bonnchallenge.org/content/challenge
[72] According to data from the Rights and Resources Initiative drawn from 33 low and middle income countries (LMICs) which collectively represent over three-quarters of forest area in LMICs globally.
[73] Rights and Resources Initiative. 2016. Closing the Gap: Strategies and scale needed to secure rights and save forests. Washington, DC: Rights and Resources Initiative. http://rightsandresources.org/wp-content/uploads/RRI-2016-Annual-Review.pdf
[74] Forest Trends is a founding partner and member of the Rights and Resources Initiative global coaltion.
[75] Hamrick, Kelley and Melissa Gallant, Forest Trends (2017). Fertile Ground: State of Forest Carbon Finance 2017.
[76] *Ibid.*
[77] *Ibid.*

5.1.3 Corporate Commitments

- Corporate commitments to reduce emissions and deforestation are proliferating, and could create both new demand for forest carbon offsets as well as concerted action aimed at reducing deforestation associated with commodity production—each of which could lead to positive outcomes for securing forest ecosystem services.
- The global aviation sector could open a potential new market for forest carbon offsets, as the International Civil Aviation Organization (ICAO) decides how airlines can reduce their emissions to meet an industry-wide target. Since renewable jet fuel is not yet widespread or economical, the industry association has turned to offsets as a way for airlines to meet emissions reductions goals, and ICAO is starting to craft its own offsetting scheme, which may include forestry offsets—although inclusion of forestry offsets has yet to be negotiated.

5.1.4 Advances in Technology

- The recent and rapid pace of improvement in technologies enabling frequent, accurate and cost-effective monitoring of forest cover change around the world allows for an unprecedented level of awareness concerning real-time threats to forests, and provides governments with the tools needed to enforce laws and policies aimed at conserving forests and the ecosystem services they provide.

5.2 Recommendations

In light of these positive trends, yet recognizing the significant progress still needed to halt global forest loss and preserve forest ecosystem services, several recommendations emerge for governments, international donors, and the private sector to accelerate the progress towards achievement of SDG15 and its targets. These recommendations, delineated by sector, include:

5.2.1 Governments

- National and subnational governments should implement natural capital accounting approaches that seek to recognize and quantify the economic value of all forest ecosystem services within their jurisdictions, and integrate these findings into official policy and planning processes for all sectors or ministries with relevance for forest management—such as agriculture, infrastructure, and others. As an example of one such initiative, the Wealth Accounting and Valuation of Ecosystem Services (WAVES) global partnership—coordinated by the World Bank—is supporting eight partner countries to better account for and integrate natural capital valuation into their development planning, with the aim of promoting sustainable development.[78]
- Utilizing this natural capital accounting baseline, governments should enact and enforce policies and regulations to directly limit or curtail the extent of forests that can legally be converted, and/or provide economic incentives that reward actors at all levels of society (individual land owners, cities, states/provinces, etc.) for concrete and verifiable steps taken to preserve existing forests or restore

[78] See: https://www.wavespartnership.org/

degraded forest land. Many national governments have several years of experiences and lessons learned from implementing these policies and regulations, and these lessons should be disseminated to inform the development of new policies in additional jurisdictions.

- In formulating these policies and regulations, the UN Forest Instrument and the UN Strategic Plan for Forests (2017-2030) provide an overall framework and a plan of action to sustainably manage forests and their ecosystems, which governments should consult and build upon. At the global level, it will be critical to further mobilize these resources and integrate their implementation into the framework and tracking of the SDGs and other key global initiatives.

5.2.2 International Donors and Agencies

- Donor countries should scale up the provision of finance and technical support to developing countries that demonstrate a commitment to more effectively and sustainably manage their forests. This finance and expertise could be directed through multilateral channels such as the Green Climate Fund, the Forest Carbon Partnership Facility, the Forest Investment Program, and other existing multilateral partnerships, or it could be channeled through bilateral partnerships, such as those being pioneered by Norway with various REDD+ countries—including Brazil, Indonesia, Liberia and Peru. There is also a need for greater investment in direct funding mechanisms which can efficiently channel finance to high-impact interventions for sustainable forest management, including public-private funds focused on sustainable landscapes.[79]
- More support is needed for tracking and data-collection initiatives to assess and report on trends and developments in forest ecosystem services investments. Forest Trends convenes several leading global initiatives of this kind, tracking developments in voluntary carbon markets,[80] public and private finance for REDD+,[81] private investments in conservation,[82] and corporate commitments to zero-deforestation.[83] This type of data is needed to track ongoing progress and identify challenges in mainstreaming forest ecosystem service valuation.
- Donors should also scale-up support for multi-stakeholder platforms which play a critical role in bringing diverse parties around a table to form collaborative and innovative solutions for more effectively valuing forest ecosystem services. As one example of this type of initiative, Forest Trends' Katoomba Incubator has for nearly two decades been hosting international convenings of diverse stakeholders which provide a forum for exchanging ideas, influencing policy-makers, and catalyzing new initiatives to promote ecosystem services markets and transactions.[84] Similarly, Forest Trends' Business and Biodiversity Offsets Program, in operation since 2004, is a global, multi-stakeholder partnership of some 80 companies, government agencies, financial institutions, and conservation NGOs and experts working together as a community of practice to define global standards for mitigating the impacts of industrial development on biodiversity.[85]

[79] Examples of these types of funds include the Althelia Climate Fund, the &Green tropical forest and agriculture fund, and the REDD+ Acceleration Fund, among others.
[80] See: http://www.ecosystemmarketplace.com/
[81] See: http://reddx.forest-trends.org/
[82] See: http://forest-trends.org/releases/p/sopic2016
[83] See: http://www.supply-change.org/
[84] See: http://forest-trends.org/program.php?id=63
[85] See: http://forest-trends.org/program.php?id=117

- The United Nations Inter-Agency and Expert Group on Sustainable Development Goal Indicators should consider ways to develop indicators which track global progress in integrating forest ecosystem services accounting and valuation into the official SDG targets and indicators. For SDG 15: Life on Land, a total of twelve targets and associated indicators have been identified to track progress. However, these targets and indicators do not sufficiently include metrics related to forest ecosystem services, representing a missed opportunity for integrating ecosystem services accounting into the SDG tracking and measurement framework.

5.2.3 Private Sector

- Companies should take part in the growing movement for corporate social responsibility by making explicit, measurable, and time-bound commitments to reduce and eliminate deforestation from their commodity supply chains. Given that nearly three-quarters of tropical deforestation is caused by commercial agriculture,[86] corporate efforts to prevent deforestation in their agro-supply chains can and must play a critical role in safeguarding forest ecosystems and the services they provide.
- Corporate leaders should actively support the efforts of national and subnational governments to prevent deforestation in the countries where they source their supply-chain commodities. Specifically, agricultural commodity companies should target their supply-chain investments to prioritize jurisdictions that have made public commitments to sustainable development and zero deforestation. As one example of this approach, Unilever has committed US$25 million in investment to the &Green tropical forest and agriculture fund—aiming to leverage matching public investment from fund donors to enhance sustainability-certified smallholder palm oil production in jurisdictions in Indonesia and West Africa that have committed to forest protection.[87] If corporate commitments and actions can be properly aligned with government policies and goals, the private and public sectors will be able to reinforce each other's efforts to achieve zero deforestation.[88]

[86] Lawson, S. (2014). Forest Trends Report Series - Consumer goods and deforestation: An analysis of the extent and nature of illegality in forest conversion for agriculture and timber plantations.
Retrieved from http://www.forest-trends.org/documents/files/doc_4718.pdf

[87] See:

1) https://www.idhsustainabletrade.com/news/fund-to-protect-5-million-ha-tropical-forests-and-trigger-16-billion-usd-private-investments-launched-in-davos/
2) http://www.andgreen.fund/

[88] Brian Schaap, Dana Miller, and Breanna Lujan. *Collaboration Toward Zero Deforestation: Aligning Corporate and National Commitments in Brazil and Indonesia*. Washington, D.C.: Environmental Defense Fund and Forest Trends. July, 2017.

Annex I

Examples of Forest Carbon Co-benefits Metrics as They Relate to the Sustainable Development Goals

Select Sustainable Development Goals & Targets	Proposed Indicators (by UN Statistical Commission working group on SDGs)	How Forest Carbon Initiatives Could Contribute	Examples of Metrics Currently Tracked by Forest Carbon Initiatives
Goal 13: Take urgent action to combat climate change and its impacts			
Target: Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 B annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation, and fully operationalize the Green Climate Fund through its capitalization as soon as possible.	Mobilized amount of United States dollars per year starting in 2020 accountable towards the $100 B commitment.	Forest carbon projects represent "meaningful mitigation actions" in developing countries. REDD+ is eligible under the Green Climate Fund but is not among the eight investments approved as of February 2016.	$ value flowing to forest carbon initiatives/year, tonnes of carbon dioxide equivalent (tCO_2e) in sequestered or avoided emissions.
Goal 15: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss			
Target: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests, and substantially increase afforestation and reforestation globally.	Forest cover under sustainable forest management; net permanent forest loss.	Forest carbon initiatives span tropical, temperate, and boreal forests and implement a wide range of activities – restoration, tree-planting, agroforestry – to sustainably manage forests and their carbon.	Number of hectares under carbon-inclusive sustainable forest management; number of hectares of avoided deforestation (against historical baselines); number of hectares of restored degraded forests or reforestation.
Target: By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts.	Number of national development plans and processes integrating biodiversity and ecosystem services values.	Because they translate otherwise un-valued ecosystem services – specifically, carbon sequestration – into economic terms, forest carbon initiatives could be a straightforward way to incorporate ecosystem values into national and local planning.	$ value flowing to forest carbon initiatives by country; $ amount of carbon income flowing to poor people.

Select Sustainable Development Goals & Targets	Proposed Indicators (by UN Statistical Commission working group on SDGs)	How Forest Carbon Initiatives Could Contribute	Examples of Metrics Currently Tracked by Forest Carbon Initiatives
Goal 1: End poverty in all its forms everywhere			
Target: By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology, and financial services, including microfinance.	Proportion of the population living in households with access to basic services.	Poverty reduction is inextricably connected to land ownership in many places, and as carbon is increasingly treated as a form of property, forest carbon initiatives could be at the forefront of ensuring equal access to the economic resources associated with carbon ownership.	Land ownership status; carbon rights status; documentation of decision-making process around how to spend carbon revenue; number of people trained in new technology (such as forest carbon measurements); number of people participating in microfinance groups.
Goal 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture			
Target: By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.	Volume of production per labor unit by classes of farming/pastoral/forestry enterprise size.	Increasing agricultural productivity among small-scale food producers is a key strategy for REDD+, since inefficient farming practices are sometimes a very avoidable driver of deforestation.	Average income of producers in project area (before and after); land ownership status; number of people trained in agroforestry or improved agricultural practices.
Goal 5: Achieve gender equality and empower all women and girls			
Target: Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources in accordance with national laws.	Percentage of people with ownership or secure rights over agricultural land (out of total agricultural population) by sex; share of women among owners or rights-bearers of agricultural land by type of tenure; percentage of countries where the legal framework (including customary law) guarantees women's equal rights to land ownership and/or control.	Forest carbon initiatives can work to give women equal access to economic resources by including gender in their design and by securing clear land and carbon rights for local people with special consideration for women.	Land tenure and carbon ownership status; number of agricultural jobs held by women versus men; number of women participating in initiative's activities (such as tree-planting groups related to carbon finance flows); number of women in leadership positions.

Select Sustainable Development Goals & Targets	Proposed Indicators (by UN Statistical Commission working group on SDGs)	How Forest Carbon Initiatives Could Contribute	Examples of Metrics Currently Tracked by Forest Carbon Initiatives
Goal 6: Ensure access to water and sanitation for all			
Target: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes.	Percentage of change in the extent of water-related ecosystems over time.	Forest carbon initiatives directly work to restore critical watersheds, both by protecting the water-related ecosystem services of forests (e.g., pollution filtration, erosion control, cloud formation) and through specific activities (e.g., drilling community wells, implementing fire management practices) funded by carbon finance.	Number of hectares under forest carbon management; number of people benefitting from improved water resources; number of forest hectares sustainably managed (e.g., for wildfire risk, which affects water quality).

Source: Forest Trends' Ecosystem Marketplace, 2016. "Not So Niche: Co-benefits at the Intersection of Forest Carbon and Sustainable Development." Washington DC: Forest Trends.

Annex II

Tracking Ecosytem Markets in the United States

Ecosystem Markets in the United States

At least $2.8 billion is transacted every year through ecosystem markets in the United States. The largest markets are for wetlands and streams, watershed services, imperiled species/habitas, and land use carbon. But markets also exist for other ecosystem service asset types, such as pollinator habitat and methane emission reductions.

Notes: All transaction data is presented for the most recent full year for which ecosystem markets data is publicly available at the time of this report. For forest and land-use carbon initiatives, this is 2014; for imperiled species/habitats and wetlands/streams it is 2011; for watersheds it is 2013.

Impact: Ecosystem market projects cover more than 9 million ha in the United States, an area roughly equal to the state of Maine.

Conservation activities: Markets channel funding to an array of conservation activities. Here are the most popular interventions paid for by ecosystem markets buyers in the United States:

Wetlands and Stream Markets

- Wetlands re-establishment
- Wetlands preservation
- Wetlands enhancement

Watershed Markets

- Watershed restoration
- Watershed preservation
- Dedication of water rights for instream flows

Imperiled Species/Habitats Markets

- Habitat preservation
- Habitat establishment

Forest and Land-Use Carbon Markets

- Improved forest management
- Afforestation or reforestation

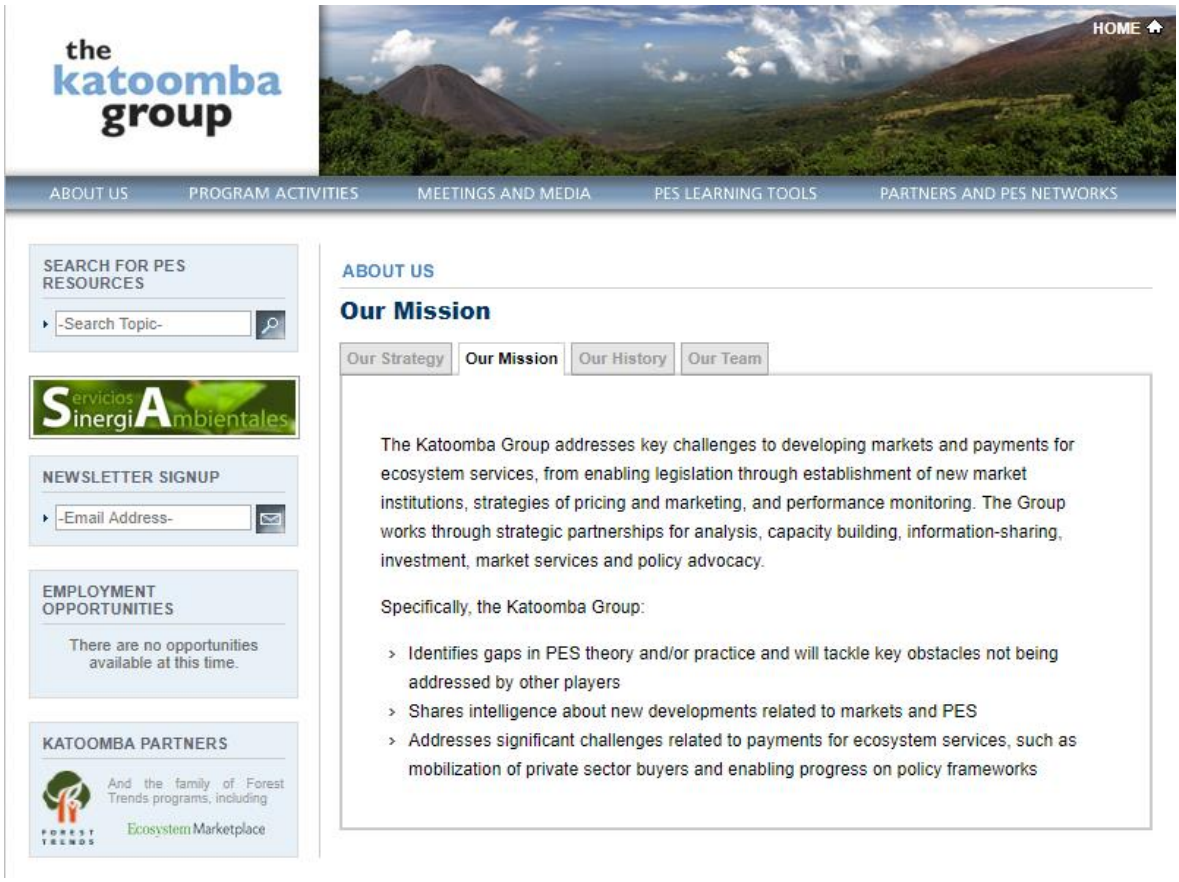
Source: Forest Trends' Ecosystem Marketplace, 2016. "An Atlas of Ecosystem Markets in the United States." Washington DC: Forest Trends.

Annex III

The Katoomba Group

Forest Trends' Katoomba Group is an international network of individuals working to promote and improve capacity related to markets and payments for ecosystem services (PES). With its first gathering in 2000, the Katoomba Group was launched as an international working group focused on advancing markets for the ecosystem services—including watershed protection, biodiversity habitat, and carbon storage. The Group serves as a source of ideas for and strategic information about ecosystem service markets. It is known for its international convenings, which have provided a forum for exchanging ideas, influencing policy-makers, and catalyzing new initiatives. Since 2006, regional Katoomba networks have formed to provide contextual responses to PES capacity-building needs. To date, regional Katoomba networks exist in Tropical America, Eastern & Southern Africa, and West Africa.

The Katoomba Group serves as a platform for the exchange of ideas and strategic information about ecosystem service transactions and markets, as well as a means for collaboration between practitioners of PES projects and programs. It has held 16 major global conferences, published and contributed to numerous publications, and supported the development of a range of new PES schemes including the BioCarbon Fund at the World Bank and the Mexican PES Fund. The Katoomba Group has also advised national policy discussions on financial incentives for conservation in numerous countries including China, Brazil, India, and Colombia.



Annex IV

The Forest Trends Brazil Matrix: Tracking Economic Incentives for Ecosystem Services in Brazil

Increasingly, national and international discussions consider the role of forests and other land uses as providers of environmental goods and services. Consequently, economic incentives and public policies are being created for the conservation of these environmental goods and services.

Having a clear sense of the overall picture of these incentives and policies is a challenge. What are the main forms and categories of payments for environmental services? What are the dimensions of these opportunities / markets? Who are involved? What are the social benefits? How can we move forward with these instruments? What are the main barriers and opportunities in the near future?

To answer these questions and map this landscape, Forest Trends developed an information framework called "the Matrix", which helps to visualize and track shifting trends in global and domestic ecosystem markets. Essentially, it is a tool to orient stakeholders in a complex and swiftly changing landscape and determine a roadmap for engagement. The idea behind the Matrix is to provide a platform that allows the general public access to crucial information, encourage the development of economic incentives to promote the conservation and recovery of ecosystem services in Brazil.

Recently a version of the Matrix was adapted for Brazil due to the growth of these markets and respective policies in the country: the Brazilian Matrix of Ecosystem Services.

As ecosystem service incentives and payments increase globally, their potential for Brazil is enormous. Brazil is experiencing a rapid development of ecosystem service incentive schemes both at the policy and project levels, as seen in Reduced Emissions from Deforestation and Forest Degradation (REDD+) and PES (payments for environmental services) legislation in several states and by the federal government, as well as in a multitude of projects throughout the country. Developing a PES Matrix specifically for Brazil provides the necessary intelligence to leverage key opportunities, catalyze strategic connections, and strengthen the institutional framework.

The Brazil PES Matrix focuses on a few key ecosystem markets: carbon, water, biodiversity and bundled payments. Carbon markets generally reward stewardship of an ecosystem's atmospheric regulation services. Water markets provide payments for nature's hydrological services. Biodiversity markets create an incentive to pay for the management and preservation of biological processes as well as habitat and species.

More information on the project and its findings, including a full image version of the Brazil PES Matrix, can be found on the project website: http://brazil.forest-trends.org/documentos/