

Working Paper

Restoring and protecting agricultural and forest landscapes and increasing agricultural productivity

Christopher Delgado, Michael Wolosin, and Nigel Purvis

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Overview

Global demand for agricultural and forestry commodities – food, fuel, fibre and timber – is rising rapidly, primarily in emerging and developing economies. This creates vital opportunities for economic growth, but it also puts pressure on natural resources. As articulated more fully in the first New Climate Economy report, *Better Growth, Better Climate*, a coordinated, integrated approach to landscape management is needed to simultaneously address resource conservation and restoration, boost productivity, bolster the resilience of rural incomes and thereby promote rural economic development and poverty reduction.¹

Many countries are already making great progress in implementation, but strong international and multi-stakeholder cooperation can help to scale up successful strategies. *Better Growth, Better Climate* showed that economically feasible land use interventions could provide more resource-efficient, more climate-compatible growth and resilience, while also providing 15–35% of the total emissions reductions needed to reach a 2°Celsius (2°C) climate pathway by 2030. These magnitudes suggest that it would in fact be difficult to reach a 2°C pathway by 2030 without significant contributions from land use. The analysis also illustrated that developing countries would necessarily be the ones in the driver's seat for implementing the required interventions.

At the national level implementation, needs to be supported by a range of measures, including the enforcement of policy focused on protecting natural capital while meeting the needs for more food and forest products, to public investment in agricultural and forest innovation systems that facilitate growth in agricultural productivity and to mobilising private investment capital for both restoration of degraded landscapes and conservation of remaining natural capital. This paper focuses on how international cooperation can help mobilize public and private financing. It was written as a contributing paper to *Seizing the Global Opportunity, Partnerships for Better Growth*,



About this working paper

This New Climate Economy Working Paper was written as a supporting document for the 2015 report of the Global Commission on the Economy and Climate, *Seizing the Global Opportunity: Partnerships for Better Growth and a Better Climate*. It reflects the research conducted for Section 2.2 of the full report and is part of a series of 10 Working Papers. It reflects the recommendations made by the Global Commission.

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New Climate Economy
c/o World Resources Institute
10 G St NE
Suite 800
Washington, DC 20002, USA
+1 (202) 729-7600

New Climate Economy
c/o Overseas Development Institute
203 Blackfriars Road
London, SE1 8NJ, UK
+44 (0) 20 7922 0300

www.newclimateeconomy.report
www.newclimateeconomy.net



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Better Climate, the major 2015 report from the Global Commission on Economy and Climate. It specifically highlights a few key developments and further opportunities in the field of international and multi-stakeholder co-operation.

On the agricultural side, the paper emphasises the need for solutions in developing countries that allow present occupants to grow and secure their livelihoods from the land, while addressing the need for restoration at scale of significantly degraded agricultural landscapes. Widespread and growing landscape degradation was shown in *Better Growth, Better Climate* to be a major factor in the lowering of agricultural productivity and the increasing vulnerability of rural people to climate change, promoting further clearing of forests and leading to rising greenhouse gas (GHG) emissions. Partial forest restoration is a necessary part of restoring agricultural landscapes, raising incomes and improving resilience. It needs to be accompanied by institutional and policy changes that can support major financing partnerships amongst people on the land, different kinds of private investors, and public actors from recipient and donor countries primarily concerned with social, economic and environmental goals. Finance is critical, as the interventions at the scale needed to better manage soil and water within a reasonable time frame are typically beyond the means of smallholder farmers and communities, and in some cases even of countries. Without new international partnerships, risks in developing country agriculture will continue to prevent financial solutions at the scale needed. Success at scale is essential to poverty alleviation, while also alleviating the pressures that led to soil and forest degradation in the first place.

In addition to the implementation of ambitious national pledges for forest restoration, the paper emphasises the potential for international and multi-stakeholder partnerships to help protect high carbon natural forests. It explores partnerships making use of emerging international agreements for the implementation of REDD+. REDD+ linked resources give developing countries new tools to implement the transition of forest and forest-margin areas to lower carbon growth paths. And particular emphasis is put on international supply chain commitments among major multinational firms pledging not to source agricultural or forestry products from recently deforested areas.

There is considerable momentum for international cooperative action on better land use already; for example, more than 175 governments, companies, civil society institutions and indigenous peoples' groups have endorsed the New York Declaration on Forests, pledging to work together to cut natural forest loss in half by the end of the decade, end it entirely by 2030, and restore more than 350 million ha of forests by 2030. Still, stepped-up cooperation is needed in three critical areas: public-private partnerships to restore degraded agricultural and forest landscapes, international finance to halt and reverse deforestation, and commodity supply chain commitments to create business incentives for sustainable land use.

The Global Commission on Economy and Climate recommends that governments, multilateral and bilateral finance institutions, the private sector and willing investors work together to scale up sustainable land use financing, towards a global target of halting deforestation and putting into restoration at least 500 million ha of degraded farmlands and forests by 2030.

Developed economies and forested developing countries should enter into partnerships that scale up international flows for REDD+, focused increasingly on mechanisms that generate verified emission reductions, with the aim of financing an additional reduction of 1 Gt CO₂e per year from 2020 and beyond. The private sector should commit to extending deforestation-free supply-chain commitments for key commodities and enhanced financing to support this.

Collectively, these efforts can lead to emission reductions of 3.3–9.0 Gt CO₂e in 2030 while making agriculture more productive and resilient, and boosting the incomes of agrarian and forest communities in developing countries.

1. Introduction

Land is a vital economic resource, particularly for developing countries, yet pressure on that resource is growing amid fast-rising global demand for agricultural and forestry commodities – food, fuel, fibre and timber. With the global population expected to grow by 1.2 billion by 2030, and the global middle class set roughly to double by 2030, the pressure will only increase.² About 70% more food calories will need to be produced by 2050, while demand for wood products will increase three- to fourfold.³ Most of the new demand is coming from emerging and developing economies, and most will need to be met by production increases in those countries.⁴

These trends create vital opportunities for economic growth, but they also pose great challenges. Agriculture and land use change, including deforestation, already produce roughly a quarter of global manmade greenhouse gas (GHG) emissions.⁵ Farmland and forests are also being degraded and lost at alarming rates, at a combined cost in the range of US\$100 billion per year.⁶ Moreover, both agriculture and forests are also increasingly threatened by climate change. Restoring degraded landscapes and improving land use practices can reduce emissions, increase sequestrations, increase resilience and boost productivity.

Healthy forest cover provides multiple key ecosystem services, including better water management, improved air quality and increased above-ground and soil carbon, which are critical goals in their own right that support surrounding communities and agricultural production. Interventions in agriculture seeking to achieve the “triple wins” of increased productivity, greater resilience and mitigation of GHG emissions simultaneously are typically referred to as “climate-smart agriculture (CSA)”, and often also include increasing tree and shrub cover.⁷ Adding tree and shrub cover in degraded agricultural landscapes can help to fix nitrogen, increase soil carbon, stabilise soils, increase water retention, improve soil fertility and improve responses to synthetic fertilisers.⁸

Forest and agricultural landscape conservation and restoration at scale require strong national policies. National or provincial governments are necessarily in the lead. Key policies include those affecting agricultural and forest technology generation and distribution; market access and infrastructure, regulations and other institutions affecting land access; ownership and zoning, the recognition and enforcement of rights to land and the rule of law; codes governing investments, foreign participation and dispute resolution; and the generation, processing and use of information and other ingredients that provide transparency and permit better social management of land for the benefit of all.

While national governments must lead, progress at the global scale requires a much larger financial effort than has been seen to date, with international partnerships mobilising commitment, skills and finance from a broader constituency. These include people already on the land, as well as private investors, knowledge providers and domestic and international investors in public development and climate. A key theme of this paper will be that scaled-up international and multi-stakeholder partnerships to support landscape restoration and conservation will work best when coordinated within whole landscapes involving forests, water resources and agriculture. *Better Growth, Better Climate* highlighted key opportunities and calls for governments and development partners to commit to restoring 500 million hectares (ha) of forest and agricultural land through scaled-up investment and adoption of proven landscape-level approaches. It also urged the public and private sectors to work together to eliminate deforestation from agricultural commodities by 2020.

The international community has taken important steps since then. The New York Declaration on Forests, launched at the UN Climate Summit in September 2014, is a pledge to work together to halve natural forest loss by the end of the decade, end it entirely by 2030, and restore more than 350 million ha of forests by 2030.⁹ It has been endorsed by 36 countries, 20 sub-national governments and 53 companies, as well as indigenous groups and dozens of civil society organisations.

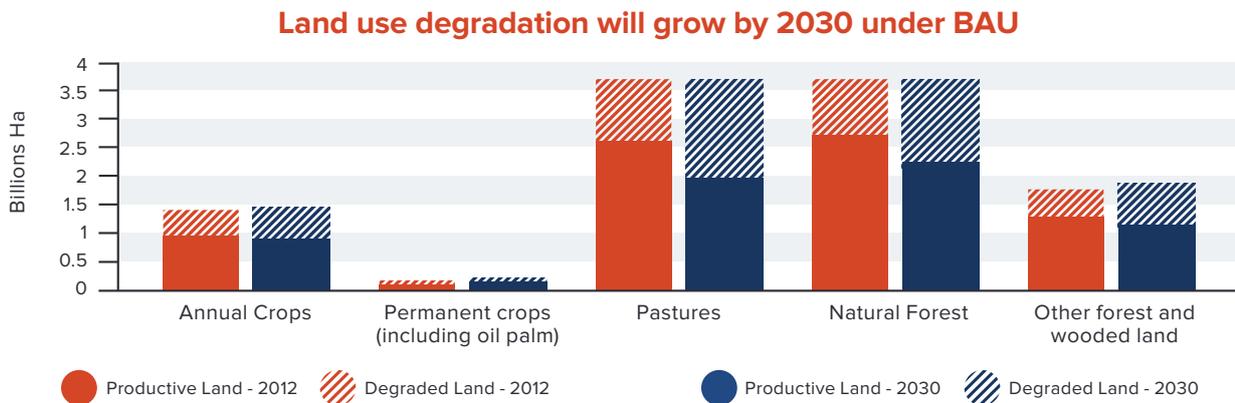
At the same time, 20 countries and many other partners launched the Global Alliance for Climate-Smart Agriculture (GACSA).¹⁰ Significant regional initiatives have also been launched, such as Initiative 20x20,¹¹ through which seven Latin American countries and other partners have pledged to bring 20 million ha of land into restoration by 2020, and the Africa Climate-Smart Agriculture Alliance, which aims to engage 6 million smallholders by 2021.¹²

Realising these political commitments is no small task. The challenge going forward will be to identify good practice and secure the finance to bring it to a large scale. This working paper focuses on three critical areas that require much greater international cooperation, involving both public and private actors: scaling up investments to restore degraded agricultural and forest landscapes, international finance to halt and reverse deforestation, and commitments and support for zero-deforestation commodity supply chains. Countries deal every day with a host of important issues pertaining to rural poverty, agriculture, water, forests and their interactions with climate, and there are always many areas for improving the effectiveness of interventions. The three areas chosen for scrutiny cover only a subset of these, but they are the ones where international partnerships involving both public and private actors are essential to success at scale, where the technical aspects of what to do are fairly well known, and where there are real prospects for significant results in the next 15 years.

2. Understanding the land use challenge

Better Growth, Better Climate defined the land use challenge as a holistic one involving people and their search for livelihoods, agriculture, forests and fresh water. Although each of these topics typically tends to be discussed in isolation, they create an interacting whole together. Rising demands for agricultural and forest products are propelled by billions of consumers, many of them only now emerging from poverty. The result of this and hundreds of millions of production responses has been massive degradation of the world’s natural, agricultural and forest resources. *Better Growth, Better Climate* argued that the only way to deal effectively with this situation at scale was through a “produce and protect” approach. This would aim both to increase the resource efficiency of expanding agricultural and forest product production, and protect high-carbon forest and clean-water resources. It acknowledges that those who can reap the benefit from using land to produce more are not always those who bear the costs of degradation. The stylized facts examined in *Better Growth, Better Climate* are laid out in Figure 1, along with the main recommendations for action.

Figure 1
Global land use needs to conserve better while producing more



<p>Key Trends Today</p> <ul style="list-style-type: none"> 800M Persons hungry 0.25% Rate of net agricultural land that will degrade every year 0.10-0.20% Rate of tropical forests that will be deforested every year 1.50% Rate of land converted to vegetable oil every year 	<p>Changes in Demand 2010-2030</p> <ul style="list-style-type: none"> 44% Growth in demand for food calories 2x The demand for wood & pulp
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With better practices, these changes in land use can **reduce global GHG emissions by 12 Gt CO₂e by 2030**, up to 35% of the cuts the world needs to stay on a 2°C path.



Zero Net Deforestation

- REDD+ conservation
- Deforestation-free supply chains



Restore 150 M ha of Agricultural Land

- Riparian barriers, windbreaks, agroforestry, silvopastoralism



Restore 350 M ha of forest

- Urban investment for improving water and air quality for adjoining areas
- Restoration of nearby agricultural areas through reduction of soil runoff and rebuilt water tables



Intensify Existing Agriculture Sustainably and Reduce Food Waste

- Rice and livestock technologies, better fertilizer and water use, storage improvements, retail and consumer outreach

Note: The land area totals in 2012 are from FAO (www.FAOSTat3.fao.org) and FAO, Global Forest Resources Assessment 2015 (<http://www.fao.org/3/a-i4793e.pdf>). The percentage of degraded cropland in 2012 is from FAO, The State of Land and Water Resources 2011 (<http://www.fao.org/docrep/017/i1688e/i1688e.pdf>). Degraded forest area is approximated by the ratio of forest and wooded areas other than “natural forest” to total forest in the FAO source. “BAU 2030” is obtained by straight-lining to 2030 observed annual changes in land use 2000-2012 in the above FAO sources, except for pastures where data reclassification prevents this.

Source: Unless otherwise indicated, data and issues are from Better Growth, Better Climate.¹³

One-third to half of the world's agricultural land was in a degraded state in 2010, and a quarter was severely degraded.¹⁴ Even as pressure grows to boost agricultural production, another 12 million ha are lost each year due to poor soil and water management and other unsustainable farming practices.¹⁵ The United Nations estimates that degradation of agricultural landscapes cost US\$40 billion worldwide in 2014, not counting the hidden costs of increased fertiliser use and the loss of biodiversity and of unique landscapes.¹⁶ In some regions, there is little land left that is suitable for agricultural expansion. Water is a particular concern: the United Nations projects that half the global population will be living in areas of high water stress by 2030.¹⁷ Climate change will further exacerbate these challenges.¹⁸

In many developing countries, land degradation is often exacerbated by expansion onto fragile hillsides and wetlands under population pressure.¹⁹ Resource mining tends to worsen as poor people on the land farm ever smaller parcels, barely large enough to subsist.²⁰ Risks are also increased by excess removal of trees and shrubs in the landscape for fuel and feed. In other places, inadequacies of land tenure and governance have allowed destructive short-term timber, pulp or palm oil production to leave large areas of severely degraded lands behind, including high-carbon peatlands in Southeast Asia.²¹ Also common is for both poor smallholders and large agribusinesses to clear forest and bush to access land for livestock, feed and other food production, particularly where alternatives for accessing land or intensifying production are either scarce or prohibitively expensive.²² Clearing tropical forest for cattle ranching has been a particular problem over time in Latin America.²³

There are thus a wide variety of degraded lands, from drained peatlands in Southeast Asia and saline irrigated lands in South Asia, to eroded hillsides in Africa and leached tropical soils from cleared forests in South America. Soils on all these lands have typically lost organic material and other nutrients, leading to losses in structure, water retention capacity and fertility; in some cases, they have become more saline or acidic.²⁴ As land is degraded, pressure is inevitably increased on surrounding forests.

Gross tree cover declined by 18 million ha globally in 2013 alone, based on remote sensing data.²⁵ How much of this is due to deforestation in the sense of clearing the land of trees and then converting it to some other use such as agriculture is not clear. The current estimate of gross annual deforestation from Food and Agriculture Organization (FAO) over the 2010–2015 period from country reporting is 7.6 million ha, somewhat offset by an annual gain in forest area of 4.3 million ha, often in different regions, for a net global forest area loss of 3.3 million ha.²⁶

Looking backwards, the link to agricultural expansion is clear: the global agricultural land area, including permanent pastures, grew by about 10%, or 477 million ha, in the 50 years up to 2013,²⁷ expanding into savannahs, prairies and forests. Although the boreal regions accounted for most gross deforestation (due to increased wood removals and fires in recent years), most of the net deforestation (in the sense of land use change) in 2000–2012 occurred in the tropics, with commercial agriculture responsible for 71% of tropical deforestation, much of it illegal.²⁸ Wood and pulp production and, in some places, mining have also played a role.²⁹ Data collected by governments show an annual average of 13 million ha of forest were converted to other uses in 2001–2010.³⁰ Although in that same period, an average of roughly 8 million ha of non-forest area was allowed to regenerate into forest each year, reducing net deforestation, they are not truly interchangeable.³¹ Thus the 2010–2015 data on net deforestation from country reporting cited above may indicate that net deforestation is decreasing, although uncertainties remain as to why gross tree cover loss from remote sensing is so much higher than estimated deforestation from country reporting. It is not at all clear that degradation of forest landscapes is decreasing; the remote sensing data seems consistent with the view that if anything it is increasing.³²

In many cases, natural forests are replaced with plantations; existing forests also continue to be degraded by repeated tree removals.³³ From 1990 to 2010, tropical forests lost carbon storage equivalent to 15% of global GHG emissions.³⁴ This has significant implications for the climate, as in 2009, forests absorbed about half as much climate pollution as was emitted from fossil fuel consumption.³⁵ The combined GHG impact of forest and agricultural land degradation is estimated at 6.2 Gt CO₂e per year.³⁶ Stopping tropical deforestation, maintaining forest carbon stocks and allowing re-growing forests and fallow lands to grow wild could mitigate 12–14 Gt CO₂e per year of emissions – a significant contribution to climate stabilisation.³⁷

GHG emissions and lost carbon sequestration are not the only ways in which deforestation affects climate outcomes and the environment. Vital ecosystem services such as water and air purification, flood control, rainfall regulation, landslide prevention and biodiversity are also at stake. About 4 billion ha of forests remain around the world,³⁸ and the value of the ecosystem services they provide has been estimated at US\$3,100–6,120 per ha. This means gross deforestation could be costing the global economy US\$40–80 billion each year.³⁹ Forests also generate many direct economic benefits, at least US\$1 trillion per year from products such as timber, pulp, fuel and food, and services such as forest-based recreation.⁴⁰ More than 13 million people are directly employed by the forest sector, and another 41 million work informally in it. Some 840 million people, or 12% of the world's population, collect fuelwood and make charcoal for their own use.⁴¹

In this context, it is important to note how central forests and farmland are to the poor. Although the share of people living in extreme poverty has been cut in half since 1990, to 21%,⁴² more than 1.2 billion people still lived on less than US\$1.25 (2005\$) in 2010, and more than 840 million regularly went hungry in 2012.⁴³ Rural areas are home to a disproportionate share of these people. About 350 million people live in forest areas, and 60 million indigenous people almost wholly depend on them for their livelihoods.⁴⁴ In low-income countries, 70% of the population is in rural areas,⁴⁵ mostly relying on agriculture for food and income. Forest, soil and water degradation all directly affect them. To the extent that they affect food availability and prices, they are also of serious concern to poor people who need to purchase their food, especially in South Asia and sub-Saharan Africa, where 40–70% of household budgets are spent on food.⁴⁶

Human-caused degradation of whole landscapes today is mainly a challenge in developing countries,⁴⁷ and any land use policy or investment intervention in developing countries is likely to affect poor people's livelihoods.⁴⁸ Low-income farmers in these countries have limited access to education, cash and credit, which makes it difficult to adapt to changing conditions. Governments themselves often lack the resources to stop degradation, much less to restore land. Working together with development partners, they need to find solutions that boost the productivity and resilience not only of the land but also of the people who depend on it.

Finally, it is vital to recognise that the problems of agricultural land and forest degradation are closely interlinked. This means they must be addressed cooperatively to achieve synergies and avoid conflicts. For example, boosting agricultural productivity could lead to increased deforestation on adjoining lands if protection of forests is not simultaneously enforced. Similarly, forest protection in one area could lead communities or agribusinesses to cut down another forested area to grow food for consumption or for export markets. Yet, as we discuss further below, there are many approaches, such as agroforestry, that can add tree cover while also boosting food production. A coordinated, integrated national approach to landscape management is needed, which aims simultaneously to address resource conservation and restoration, boost the productivity of land and promote rural economic development and poverty reduction.

3. International cooperation for landscape restoration and protection

3.1 GLOBAL PARTNERSHIPS FOR EXPANDING HIGH-LEVEL COMMITMENTS TO RESULTS

High-level public commitments raise both the domestic and international profiles of forest conservation and landscape restoration. They also increase the engagement of top political and business leaders, which helps to facilitate government-wide or enterprise-wide resolution of sectoral or departmental concerns that sometimes inhibit implementation. As noted in the introduction, such commitments are expanding rapidly.

The forest sector has led in this type of high-level coalition-building. The Bonn Challenge of 2011 invited governments, businesses and others to register pledges to restore deforested and degraded lands, with a goal of 150 million ha by 2020. As of late March 2015, 11 countries had committed to place roughly 60 million ha into restoration by 2020.⁴⁹ The New York Declaration on Forests, launched in 2014 at the UN Climate Summit, included an explicit pledge to work together to cut natural forest loss in half by the end of the decade and end it entirely by 2030, the first time a large number of nations have agreed to a global target date for ending deforestation. The Declaration commits to end deforestation from the production of agricultural commodities such as palm oil, soy, paper and beef no later than 2020.

The New York Declaration also expanded on the Bonn Challenge, with a new goal of putting 350 million ha into restoration by 2030.⁵⁰ That matches Aichi Target 15, which calls for restoring 15% of degraded ecosystems by 2030, and a 2011 estimate that there were 2.3 billion ha of degraded forest landscape globally.⁵¹ *Better Growth, Better Climate* estimated that this level of restoration could bring net economic benefits of about US\$170 billion per year, including forest products, higher crop yields due to improved ecosystem services, and recreation.⁵² Along with the 130 initial signatories, others were invited to join, and as of August 2015, the total stood at 179, including governments, businesses, civil society organisations and indigenous peoples' groups. These signatories pledged not only to work towards achieving the outcomes on the ground, but also to ensure that large-scale economic incentives are in place commensurate with the size of the challenge.⁵³

In 2012, leading consumer goods companies partnered with a number of governments and environmental organisations to create the Tropical Forest Alliance 2020 (TFA), a shared platform to eliminate deforestation from global commodity markets.

The TFA's membership includes companies with significant shares of global markets in agricultural and forestry commodities, such as Unilever, Nestlé, Danone and McDonald's. These platforms are helping to spread standards across entire markets, for example in palm oil where more than 60% of global trade is now covered by publicly stated responsible sourcing guidelines.⁵⁴

The Global Partnership on Forest Landscape Restoration, meanwhile, is providing a knowledge platform for organisations and individuals interested in forest restoration, to build consensus and commitment.⁵⁵ And other initiatives are emerging, such as the climate-smart agriculture (CSA) and forests programmes under way in the business-led Low-Carbon Technology Partnership initiatives under the World Business Council on Sustainable Development (WBCSD), which seek to remove the barriers to broader deployment and development of climate technologies.⁵⁶

Work began on building a Global Alliance for Climate-Smart Agriculture (GACSA) in 2011, about the same time as the launch of the Bonn Challenge.⁵⁷ There was a desire to invest more in agricultural productivity and resilience to climate shocks in developing countries after the 2008 and 2010 global food crises.⁵⁸ GACSA was launched at the UN Climate Summit, in parallel with the New York Declaration on Forests.⁵⁹ It aims to advance cooperation on a wider policy framework for implementing climate-smart agriculture, by bringing together investors and public funders, facilitating knowledge transfers among countries, and fostering international dialogue on how to improve the enabling environment for cooperation on CSA.

Amid all these efforts, there is renewed emphasis in international policy discussions on how the public and private sectors should cooperate to more adequately deal with the need for climate adaptation in agriculture and forest protection.⁶⁰ The revamped Consultative Group on International Agricultural Research and the new Global Research Alliance on Agricultural Greenhouse Gases are helping to advance and accelerate crucial research.⁶¹ International policy discussions on agricultural water and healthy ecosystems in the context of looming water scarcity are also increasing the scope for critical international collaboration in an area vital to agricultural resilience to climate change.⁶²

3.2 THE RISE OF REGIONAL INITIATIVES

Regional initiatives have particular potential to engage national leaders, who are likely to interact more frequently and more deeply with their regional peers than at the global level. Regional initiatives also present the most immediate opportunities for sharing technical information and good practice, often within the framework of common technical institutions such as regional agricultural research centres and regional development banks. They benefit from the experience of many countries within the same region, and embody the principle of increasing South-South cooperation, especially if good regional practice can then be transferred across continents.

The new Africa Climate-Smart Agriculture Alliance seeks to see 6 million smallholder farms in Africa practising CSA within seven years. This effort contributes to the New Economic Partnership for African Development Vision 25x25, which aims to reach 25 million African farm households with CSA on some part of their holdings by 2025.⁶³ In addition, Ethiopia, the Democratic Republic of Congo, Uganda and Rwanda have pledged to collectively restore 27.5 million ha of degraded forest landscape under the Bonn Challenge.⁶⁴ Most recently, the African Ministerial Conference on the Environment in Cairo in March 2015 discussed an initiative to restore 30 million ha of forests, including watersheds, in Africa by 2030.⁶⁵

Initiative 20x20 in Latin America and the Caribbean has achieved particular momentum.⁶⁶ Launched at the Lima Climate Change Conference in December 2014, it aims to bring 20 million ha of degraded agricultural and forest lands into restoration by 2020. Mexico, Peru, Guatemala, Colombia, El Salvador, Ecuador, Chile, Costa Rica and two regional programmes pledged to support the initiative. Since then, Nicaragua has joined, Chile has increased the size of its restoration plan, and the 20 million ha goal for pledges has already been exceeded, with more commitments imminent.

Initiative 20x20 is facilitating technical support to countries committed to restoration, and the plan is to do the same for the two civil society regional programmes that have submitted restoration pledges to 20x20. Studies and workshops are targeted at key common issues such as fiscal and regulatory incentives for restoration, monitoring systems, assessments of specific restoration opportunities, and increasing access to seeds for native species. Technical support for the initiative comes from the World Resources Institute, the International Center for Tropical Agriculture, the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Biodiversity International, and the International Union for the Conservation of Nature. This is complemented by a wide variety of technical institutions in the countries concerned.

Beyond the active engagement of leaders, a defining characteristic of Initiative 20x20 is the active participation of private-sector impact investors.⁶⁷ Permian Global, Moringa Fund, Althelia Climate Fund, Rare, Terra Global Capital, the Forestry and Climate Change Sub-Fund, Sustainable Land Management Partners and EcoPlanet Bamboo have earmarked an aggregate of US\$670 million for investment in 20x20 restoration projects as of publication; others are likely to join over time.⁶⁸ Contacts have also been initiated with institutional development and climate finance investors with a regional focus on Latin America, both to explore options for a first-loss risk facility for the initiative and to boost resources available to impact investors to invest in the initiative.

There seems little doubt that the 20x20 partnership is facilitating collaboration between those with a stake in degraded land (governments, private companies handling outputs from the land and selling inputs to farms, landowners and people living on the land) and international investors that seek impact in addition to returns. Much has been achieved in a short time in terms of securing commitments, sharing experiences, identifying opportunities, and anticipating bottlenecks. The key now is to follow through with effective implementation.

3.3 THE CRUCIAL ROLE OF INTERNATIONAL FINANCING COOPERATION

A major reason why international cooperation is needed to achieve landscape restoration goals is the sheer size of the investments required. Typical out-of-pocket restoration cost for forests in formal projects are of the order of US\$1,000–3,000 per ha, exclusive of land costs, and depending on species, method, natural conditions and scale of operations.⁶⁹ As a gross estimate, exclusive of land values, restoring 350 million ha of forest landscape over the next 15 years would therefore cost between US\$350 billion and more than US\$1 trillion, or US\$23–67 billion per year. This scale of finance would be difficult to raise under any circumstances. It is even more challenging here because it might take decades for trees to grow and all the benefits to be realised. This scale of finance simply will not materialise in developing countries without institutional arrangements to equitably share costs and benefits among all stakeholders.

Forest conservation financing has the additional problem that, almost by definition, conservation implies that wood extraction is reduced from the “business-as-usual” rate – possibly to zero – and thus represents a financial cost rather than a benefit from the change in management. While some costs can be recouped through expanded ecotourism and support for green infrastructure from water companies and cities, most of the returns to forest conservation are not directly market-mediated. Cooperation is required to monetise payments for valuable ecosystem services, and especially for transfers across national borders, as all benefit but only some conserve.

Agricultural land restoration can cost even more per hectare than forest restoration, depending on the extent of the project and the infrastructure conveyed. However, the economic benefits tend to come much sooner than for pure forests, and keep coming annually. *Better Climate, Better Growth* recommended putting 150 million ha of degraded agricultural land into restoration by 2030, or about 12% of all degraded agricultural land.⁷⁰ Even at a simple estimate of US\$1,000 per ha, at the low end of the forest restoration project cost range, 150 million ha of agricultural restoration would require US\$150 billion in funding for restoration costs in addition to the initial cost of the land itself.

Another reason why international cooperation is crucial is that risks are either very high or not well known. Once political and governance risks are minimised through political will and increased policy capacity, financial risks need to be addressed. Investing large sums in developing countries can be risky for a variety of reasons, but sectors involving smallholder farmers, indigenous peoples in forests, remote and degraded areas, and industries highly dependent on weather outcomes are especially risky. International cooperation is needed to pool risks across large regions and to channel concessional financial resources in a way that leverages large sums of private capital that would not otherwise be available, given the risks involved.

3.4 WHO NEEDS TO COOPERATE?

National governments are indispensable partners in both landscape restoration and protection. The size of resource flows, the prevalence of sensitive political issues, the involvement of foreign entities, and the need to coordinate across sectors all make it important for national governments to lead partnerships that operate within their borders. At the very least, they need to specifically delegate that leadership to an organisation within the country.⁷¹ Restoring and conserving landscapes fundamentally entails improving the governance of natural resources that are adversely affected by market and governance failures; it thus needs to start with strong political will from leaders. Within that framework, sub-national governments, bilateral donor agencies, multilateral agencies, multinational companies, domestic companies, other investors, indigenous peoples’ organisations, farmers’ organisations and other civil society organisations all have a role to play.

Political will and country ownership are closely related. Paradoxically, “global” (in the sense of being open to all) partnerships such as the New York Declaration tend to be implemented as a series of bilateral partnerships between host country governments and external and domestic partners, both public and private. Regional (multi-country) partnerships have these aspects as well, but also tend to emphasise commonalities across the target countries and cooperation among them. Regional partnerships thus represent a collective effort by regional political leaders who are seen organising and overseeing cooperation in the region – instead of an agency of a foreign donor country government, a multilateral donor, or a multinational corporation. This collective ownership of regional initiatives can help to maintain political will in the participating host country governments.

Whatever the structure of the cooperative initiative, political commitment and institutional capacity are key to turning high-level statements into action. Progress also requires funding to support the implementation of commitments, in the form of investments that are coordinated with and respond to land use policies. Such funding has been woefully inadequate to date. In the sections that follow, we examine three key areas that require enhanced international cooperation, including new approaches to finance. They are landscape restoration (mixed forest and agricultural), financing for tropical forest conservation, and supply-chain agreements to stop deforestation.

4. Financing and implementing cooperation for landscape restoration

4.1 TYPES OF RESTORATION AND CLIMATE-SMART AGRICULTURE

There are many types of forest restoration, just as there are many types of forests. Ecological restoration attempts to recreate a native ecological system that has been degraded; regeneration or planting of native species is important, as is refraining from harvesting. At the other end of the spectrum, there are plantation forests of trees of the same age and species (often non-native) for harvest. In between, there are variants such as plantation agriculture (such as oil palm), agroforestry (such as trees or shrubs grown in association with field crops), and mosaic forests, which involve patches of forest of different ages, and perhaps including a mix of natural forest and plantations, planting trees on field borders or steep slopes, or even interspersing trees within farmers’ fields (such as farmer-managed natural regeneration in dryland Africa).

Key differences for present purposes involve whether tangible economic benefits (such as sales of crops and timber) can be associated, through good design, with increased ecological benefits such as long-run carbon sequestration, or whether the two forms of benefit must be traded off against each other.⁷² If there is a trade-off, regulation, enforcement and perhaps external financing may be necessary to overcome the difference between what is in the common good and what is in the individual landholder’s economic interest.

It is also noteworthy that a great deal of forest restoration today is happening in agricultural areas, as farmers increasingly recognise the need for more trees to prevent soil degradation and water runoff, fix nitrogen and generally restore already degraded soils, especially under tropical conditions of rainfall and heat.⁷³ In some cases, soil degradation on tropical plots cleared of trees and cropped a few years under high heat and rainfall has proceeded to the point that they are no longer useful for agriculture and are abandoned to regenerate as best they can through natural forest regeneration.⁷⁴

Agricultural landscape restoration typically includes protecting fragile areas, such as natural forests and wetlands, to leave areas dedicated to generation of vital ecosystem services. It also often involves reforesting steep slopes, to protect against erosion and landslides. Trees, bushes and grasses may be planted or cared for in and around fields, pastures and water courses; terraces and contour bunds (small earthen or stone walls running along the soil contour) or other structures may be created for soil and water management. In addition, farmers may spread organic manures and mulches, and adopt new crop and grazing rotations. Many of these activities on their own produce the “triple wins” of CSA (for productivity, resilience and mitigation) at the landscape level, but they can also facilitate the uptake of other innovations such as improved seeds, improved inputs and better agronomic and husbandry practices by amplifying the benefits of those inputs and practices.⁷⁵

Landscape restoration technologies vary widely in their short-term economic benefits to local people. Set-asides or “enclosures” for biomass regeneration, for example, will restore land, but do little for local livelihoods for a long period. Some large agricultural development programmes that include restoration emphasise immediate financial benefits, with fewer lasting impacts on ecosystem services. Yet in almost every case of agricultural restoration in small farm areas, institutional change that includes active local government engagement is necessary to equitably share the costs and ensure compliance with the

responsibilities of producing a larger overall set of economic and ecological benefits through a “landscape approach”.⁷⁶ Proactive support to building the capacity of local government and helping to improve governance is often a prerequisite of success in pursuing landscape-level interventions.⁷⁷

As argued in *Better Growth, Better Climate*, climate smartness is in fact necessary to ensure both agricultural growth and increased resilience of rural livelihoods to climate change in developing countries. Climate change is projected to disproportionately affect the livelihoods of poor farmers and forest-dependent people in tropical countries, reducing crop production growth relative to growing demand from rising populations and higher wealth, putting upward pressure on food prices. And the benefits of CSA under developing-country conditions are tied to increasing the carbon content and penetration of soils. This can be achieved, for example, by using new seeds or practices in a single field, or improving animal breeding or grazing practices in a given location, but often involves actions over a larger landscape, where carbon storage upstream, for example, leads to productivity and resilience gains downstream.⁷⁸ Thus agricultural landscape restoration is both CSA on its own and a key facilitator for other aspects of CSA in the restored areas.

4.2 CASE STUDIES OF THE COSTS AND BENEFITS OF MIXED LANDSCAPE RESTORATION AND THE ROLE OF INTERNATIONAL FINANCE

Estimates of the financial costs of landscape restoration per hectare depend on the extent of degradation of the resource at the start of the activity and the extent of major land management or water investments (such as new irrigation) undertaken in the process. A common approach for assessing costs, whether for forests or agriculture, is to divide the total cost of a restoration project by the project land area. Even this requires deciding whether to use the exact areas actually restored by the project (where trees are planted on ridge lines in patches, etc.), or the much larger reported total project area. The latter is by assumption the main catchment that benefits from the ecosystem services improved by works on specific sub-areas of the project.⁷⁹ Cost and benefits also depend on whether restored trees are harvested at some point or left as permanent ecological improvements.

It can also be difficult to gauge the economic returns to the people actually restoring the land. Farmers may benefit from improved crop yields from restoration investments on their own land, or have new forest products to sell, but they may also be affected by the restoration efforts of others in the surrounding area, or the lack thereof. Those impacts can be significant. Farmers downstream or downhill often depend on those upstream and uphill for a reliable supply of clean water, for example. As discussed in *Better Growth, Better Climate*, some of the biggest benefits of restoration, such as better water retention, cleaner and more plentiful water supply, cleaner air, higher biodiversity and better pollination, will not be fully capturable in a monetary sense by the people who invested in the restoration. Public policy leadership and investment therefore play an important role in almost all cases of landscape restoration.

The following three case studies provide practical insights across a broad range of situations as to when a more public-goods investment approach to support policy is needed, and when incentives specific to targeted behaviours can improve climate and other ecosystem outcomes through payments for ecosystem services (PES). The first case is a successful public development finance approach on very small farms in Rwanda; the second is a successful public environmental finance approach with somewhat larger (but still modest, roughly 40 ha on average) farms involving PES in Colombia, Costa Rica and Nicaragua. The third involves full forest restoration over a wide area of mainly private, mainly medium to larger-scale landholdings in Costa Rica, assisted by general public funding that evolved in a way to ensure sustained dedicated financing.

These projects together suggest (but clearly do not establish) an interesting hypothesis about a potential division of labour between public-sector development and climate finance. This is that agricultural landscape restoration in places with high population density, high poverty and higher aridity (lowering the potential for carbon storage) will likely need to rely on financing with a specific poverty impact focus, as it provides returns mainly in the form of enhanced and more resilient livelihoods for the poor. Forest restoration for ecosystem services and agricultural landscape restoration in areas with lower population density, lower poverty and a moister environment sequester more carbon and thus may be relatively more attractive candidates for financing seeking an impact on mitigation.

Reclaiming eroded hillsides for cropping in Rwanda

Rwanda’s agriculture sector is constrained by the highest population density in Africa⁸⁰ and strict land limitations: 90% of Rwanda’s arable land is on hillsides, typically with steep slopes; average farm size is 0.4 ha.⁸¹ The benefits derived from counteracting widespread and deep soil erosion and other natural resource degradation from activities upslope accrue not

only to the implementing farmer, but also to those downhill. The Land Husbandry, Water Harvesting and Hillside Irrigation (LWH) Project was launched in 2008 and eventually attracted external development finance totalling US\$140 million, targeted at restoring 20,000 ha of land.⁸² The project is building terraces, bunds, and water harvesting and small-scale irrigation infrastructure.

As of August 2014, about half the target area had been restored, and yields of maize, beans and Irish potato in treated areas had risen to 30%, 167% and 219% above their respective national averages.⁸³ Incomes from restored non-irrigated hillside fields were estimated at US\$2,189 per ha in 2014, compared with US\$469 per ha at inception in 2009, and the number of direct female beneficiaries in 2014 was already almost 45% above the 2017 target of 55,000.⁸⁴ Emission reductions of 2.8 tonnes of CO₂e per ha per year are projected over 20 years, for a total investment cost of US\$10,885 per ha.⁸⁵ Farmers have more than doubled their sales of produce, boosting their meagre incomes significantly, so from a livelihoods perspective, the overall economic return to investment appears strong.⁸⁶ However, with carbon storage costing nearly US\$200 per tonne of CO₂e, the project is unlikely to attract climate finance.

Public approaches such as this, where the government works directly with farmers' groups, are critical in areas where infrastructure is poor, wealth and educational levels are low, and individual farmers may not have the incentive to act alone. However, *Better Growth, Better Climate* estimated that, at best, international public development finance could restore 15 million ha of degraded agricultural land between 2015 and 2030 through large-scale, capital-intensive and skills-intensive restoration projects. It is thus crucial to mobilise private capital as well where conditions are suitable for this. Overtime, the scalability of landscape restoration in places like Rwanda will depend on finding ways for farmers to combine abundant labour with scarce capital and land in production of labour-intensive high-value commodities of interest to private-sector investors, such as speciality coffees.⁸⁷

Restoring whole landscapes through silvopastoralism in Latin America

Silvopastoralism is a cattle production system in which cattle are raised in a biomass-rich, dense environment of trees, shrubs and grasses. It has a documented history of successful restoration of highly degraded pastures in Latin America. The World Bank partnered with CATIE in 2002–2008 in pilot work with 265 farmers operating 12,260 ha of land in Colombia, Costa Rica and Nicaragua to investigate the advantages of silvopastoralism and how PES would work on relatively smaller farms.⁸⁸

Silvopastoral interventions established on 3,673 ha were found to sequester on average 19.6 tonnes of CO₂e per ha per year in soils and above-ground biomass combined between 2003 and 2008.⁸⁹ Other demonstrable outcomes included better water management, improved biodiversity, decreased soil erosion and sharply decreased use of herbicides. Farmers using the technology could increase stocking by an average of 1.8 head of cattle per ha before, to 2.5 head of cattle per ha afterwards, and their net (market) incomes increased on average by US\$44 per ha to US\$90 per ha per year (depending on the country). PES receipts based on increasing biodiversity averaged US\$74 per ha per year over five years, and were in addition to the farmers' higher market incomes. The assessment judged PES essential to engaging farmers, but the payments were small, equivalent to US\$3.75 per tonne of CO₂e (though not targeted to carbon explicitly).⁹⁰

There are indications that, after a long delay, interest in promoting silvopastoral approaches is progressing in the region. The *Federación Colombiana de Ganaderos*, representing Colombian livestock producers, is very actively promoting the approach for restoration of degraded grazing areas, including using foreign sourced resources such as from the World Bank to promote the activity.⁹¹

Large-scale forest restoration in Costa Rica⁹²

There is widespread agreement that Costa Rica is a success story in large-scale forest restoration after significant deforestation. In 1943, forests occupied 3.9 million ha of Costa Rica, 77% of the country's land area. Crop production and cattle grazing – supported by a rapid expansion of the road network – became the prime causes of deforestation over the course of the next quarter-century. By 1986, forests occupied less than 2.1 million ha, or about 41% of the country. Denuded slopes threatened to accelerate sedimentation of reservoirs in a country where hydropower generates about three-quarters of electricity.

Cattle ranching was a large industry in Costa Rica during the 1970s, enjoying subsidised credit, price guarantees and other perks. But the industry rapidly declined during the 1980s due to a fall in international beef prices and the removal of national cattle subsidies under fiscal austerity. The profitability of ranching marginal lands declined. Thus, from 1986 onwards, Costa Rica was able to convince landowners to pursue forest restoration principally through natural regeneration on abandoned pastures.

By 2005, forest area had increased by 394,000 ha, to cover 48% of the country. In 1996, Costa Rica shifted its approach away from difficult-to-sustain subsidies financed by the general treasury, to a PES system financed by a dedicated 3.5% tax on fossil fuel sales as well as fees on beneficiaries of forest-based ecosystem services. This institutional innovation ensured a continuing supply of finance for the programme, helped to ensure participant belief in its continuation and removed dependence on external finance. PES was not the main driver of change, but provided a tool to help.

Perhaps for this reason, uncertainties remain with regard to applicability elsewhere. The PES system seems to be more amenable to larger or wealthier landowners that have a variety of income sources and may be in a better position to take a longer-term view of the returns to land. Compensation was not enough to cover the full opportunity costs of alternative land use, producing a bias towards landowners whose livelihoods do not depend on the payments and a bias towards the protection of less productive land. On the big plus side, restoration curtailed soil erosion and sedimentation of waterways, and protected biodiversity. Eco-tourism also emerged as a major industry that provided new employment opportunities and contributions to the national economy. The number of tourists visiting Costa Rica jumped from just 60,000 in 1986 to 1.7 million in 2005, although likely most of the increase is ascribable to the development of beach resorts.

4.3 CURRENT FINANCING OF PRODUCTIVE LANDSCAPES

Global or regional commitments of leaders to restoration are necessary, but not sufficient. Mobilising significantly higher levels of overall investment in restoration will require leveraging significantly more, targeted investment. A key issue is whether private investment in landscape restoration or resource conservation will occur in developing countries at a large enough scale to make a difference.

Current global investment from all sources, public and private, in restoration and conservation of mixed landscapes is estimated at US\$50 billion per year, of which about half is in emerging and developing countries; about 40% of the latter comes from developed countries.⁹³ Most of this figure is projected by the Global Canopy Programme to be from private sources. Yet data on private investment in this area are highly uncertain; a recent careful analysis of international public project finance by the Climate Policy Initiative found US\$5.8 billion in commitments for land use-related mitigation and adaptation activities in developing countries, representing just over 4% of total public international climate finance tracked in 2012–2013.⁹⁴

On the other hand, global needs in the conservation and restoration area have been independently estimated at US\$200–300 billion per year.⁹⁵ This leaves a likely global shortfall of about US\$150–250 billion per year, largely in developing countries. For context, the FAO estimated net investment in agriculture in low- and middle-income developing countries at US\$218 billion per year in the mid-2000s for all purposes, with roughly 77% from on-farm investment; foreign direct investment and official development assistance each having contributed about 1.5% (US\$3.4 billion and US\$3.1 billion, respectively).⁹⁶

Considering that overseas development assistance (ODA) and existing private foreign direct investment (FDI) to agriculture and forests in developing countries for all purposes is less than US\$7 billion per year, as noted above, it is likely that most of the needed new investment in landscape restoration, if it is to occur, will have to come from domestic sources – mostly farmers themselves in small increments – and greatly expanded investment from the international private sector. The latter is where new international partnerships could come in, and would likely involve “impact investing” – a term for private (typically internationally active) investors seeking to achieve impacts on social or environmental issues at the same time as financial returns.⁹⁷

A recent assessment by the NatureVest impact investment unit of The Nature Conservancy of impact investing in natural resource conservation surveyed five major institutional investors and 51 private investors active in seeking impacts in natural resource management and conservation. Conservation was defined as both restoration and protection of agricultural and forest landscapes. Most impact investments in the private sector still came from funds sourced from large publicly funded financial institutions such as the International Finance Corporation or the Regional Development Banks, and most of these were for water conservation.⁹⁸

The survey found that the private-sourced funds surveyed provided US\$1.2 billion in 2009–2013 for investments in sustainable agriculture, aquaculture and forest products, but only 14% of this was in developing countries.⁹⁹ However, the same entities planned to deploy US\$1.5 billion in already raised capital and a further US\$4.1 billion in anticipated new capital over five years starting in 2014, with increased exposure to emerging and developing countries. Private impact investing overall doubled from 2004–2008 to 2009–2013, and it is expected to triple in 2014–2018.¹⁰⁰

The Global Impact Investing Network has compiled a comprehensive profile of impact investing through the IMPACTBase database. This shows 310 private impact funds operating globally in all impact themes, as of August 2014, including 173 investing in developing and emerging economies.¹⁰¹ With overlap across categories, 43 of the 310 funds listed investments in “food and agriculture”, 39 in “sustainable land use”, and 21 in “carbon & environmental commodities”. Average committed capital per fund in all sectors was US\$52.5 million, for a total of over US\$16 billion. A conclusion is that impact investing – largely absent a decade ago – is a reality today for developing countries and for landscape restoration, but there is still much room to grow. Impact investing in agriculture and forests will likely overtake ODA to agriculture and forests in monetary terms within one to two decades, and this in addition to private FDI to agriculture and forests.

4.4 CAN A PRIVATE IMPACT INVESTOR MODEL BE SCALED UP FOR LANDSCAPE RESTORATION?

The above evidence suggests that some land projects in developing countries meet the return versus risk profiles and impact potential needs of private impact investors, but not many so far on a global scale relative to need. Whether impact investing can be scaled up enough to make a global difference depends on how quickly and how deeply (i.e. what volume of projects) potential returns can be increased, risks decreased for those with good potential returns, and the faith of limited partners in likely impacts increased. As will be shown, the latter is critical to finding institutional solutions to decreasing investment risks.

The financial bottom line matters to impact investors, as in all private investing. Of 42 impact funds identified by IMPACTBase as primarily targeting environmental impacts, only one reported a willingness to accept below-market returns, compared with 48 out of 151 funds primarily having a social focus. The environmental impact investors’ targeted internal rate of return (IRR)¹⁰² on investments involving real assets (such as land) was 15%, although known cases of below-market rates of 5.5% in environmental impact investing were acknowledged. Fund managers sought IRRs of 5–10% in the conservation area. Investments in Africa on average needed IRRs 5% higher than comparable conservation investments in Latin America.¹⁰³ Both the IMPACTBase database and the NatureVest survey show that fixed income impact investors will often be willing to accept a 5% return on debt for conservation as long as risks are managed.¹⁰⁴ Managing risks is key to increasing investment at any given rate of return.

However, impact also matters. The NatureVest survey split its sample into 33 primarily for-profit funds and 16 primarily for-impact funds and sought to assess the relative importance of various reasons for investing. While the for-profit group unsurprisingly put the highest weight on financial returns, it rated conservation impact only slightly lower. This reflects a key defining element of impact investing, which is that the primary investors tend to be much more hands-on about choosing how their funds are invested.¹⁰⁵ This is likely to be especially true where the limited partner is a publicly funded institutional investor accountable to national treasuries.

Impact investing in restoring and conserving landscapes is a medium- to long-term business. Financial returns can come from some form of monetisation of ecosystem services restored or conserved, from a commercial activity such as sustainable agriculture or forestry, or from some combination of the two.¹⁰⁶ The private market for selling verified carbon offsets is currently modest, but it could have a major impact on profitability and potential scale of activities leading to substantial verifiable carbon sequestration if it picks up. In the meantime, payments for carbon sequestration under publicly financed programmes, such as REDD+, can potentially provide substantial returns to restoration investments; PES from water users requiring landscape restoration upstream are another revenue source.¹⁰⁷

Commercial activities include sales of agricultural commodities (as in the case of silvopastoralism discussed above) or forest products, sustainably managed and harvested. Initiative 20x20, discussed above, targets restoration projects providing tangible income over the medium and long term from sales of forest and agricultural projects, ecotourism fees, carbon credits and fiscal savings from a lesser need for public authorities to purchase hedges on international grain prices, given the lower the risk of domestic food insecurity.¹⁰⁸

Yet even if impact investors want to do more where conditions are right, it is unclear whether there will be enough bankable projects. The NatureVest survey found serious concern about the low supply of deals with appropriate risk–return profiles.¹⁰⁹ Specific issues raised included having adequate collateral, high enough prospects for future cash flow and a high probability of acceptable financial return, on top of the need to have an acceptable likelihood of demonstrating high impact. A different review of financing of landscape restoration projects in developing countries also noted the shortage of bankable deals as a major constraint.¹¹⁰

A key issue in assuring an investor of a return is the ability of the borrower to show that there is a ready market for any expanded output, which can be problematic when infrastructure is poor. Restoration projects can generate high returns; the issues are

more in the governance, technical skills, infrastructure and management availability – the “enabling environment”. With the right enabling environment, impact investors can excel as “project originators”, identifying and framing projects in a way that investors can accept. They may also closely support the project in its early phases.

Public-sector finance has a role in creating the conditions that increase the supply of bankable deals. The political will required to significantly improve land use outcomes must be informed by strong policy-making to address market and governance issues. This requires an adequate base of policy-relevant information and analysis at the disposal of those decision-makers willing to act. Mostly public-sector-financed investment will likely be needed for capacity-building, information systems and concessional bridge funding for project start-up costs.

Scaling up private impact investment requires increasing the amount of money going from primary investors (“limited partners”) into entities such as impact funds that can originate and help to develop viable projects. In most cases, these projects need to have returns that are competitive with alternatives with similar risk levels. A key component to success is to find ways to handle the risks involved. Third, impact funds need cost-effective ways to demonstrate actual impact to an array of possible limited partners who will be actively engaged in the choice of projects. Finally, public and philanthropic institutional investors are likely to play an important role as limited partners of private impact funds. This will impose much greater demands for transparency and community consultation in decision-making than in “business as usual”.

4.5 THE KEY ROLE OF SHARING RISKS ACROSS DIFFERENT TYPES OF INVESTORS THROUGH INTERNATIONAL PARTNERSHIPS

International collaboration could make a significant contribution to accelerating restoration by finding ways to expand the “limited partner” input of investible capital handled by impact investors. Ultimately, the bulk of such funds will need to come from general private investors. Wealthy individuals and institutional investors looking for stable long-run rates of return, such as sovereign wealth funds, pension funds and insurance companies, currently control in excess of US\$100 trillion in investment assets. The interest rates they earn have historically been very low due to excess saving relative to credible demand for investment, which suggests the potential for attracting more investment to restoration and conservation.¹¹¹

Risk mitigation is key to encouraging private investment. The costs of containing risk will likely need to be shared between the public and private sectors. Where agricultural sales are an important part of projected returns, for example, public finance may be required to provide a bridge until natural resource restoration is far enough along to provide adequate market return on its own to compensate for investment costs.

Risk accentuates these needs. Investors in rural areas of developing countries tend to face all the usual risks of investment, but also additional concerns about commodity market risks, policy and political risks, unreliable infrastructure, macroeconomic risks, weather risks and business risks such as difficulties in finding trained managers. Differential risks are an often-cited reason why loan rates are different to different borrowers, and conversely why some projects need to have a higher return than others to attract investors.¹¹²

The different objectives of different categories of investors provide an opportunity for improving risk–return profiles to each category through collaboration, boosting the overall pool of resources available. Public or philanthropic institutional investors may be most concerned with impact, but worry that their potential concessional funding is too small to meet needs. They may take bigger risks to leverage higher levels of good investment by others. Some impact investors may wish to get the chance for higher returns by taking an equity stake, and are willing to take on the risk of equity, but not a large share of it. Others, such as pension funds, may be content to have a lower but predictable long-run return on debt that is well protected from loss. The concept of “Green Bonds” (e.g. fixed-income impact investments) in restoration is attractive in principle, but is only likely to be marketable at scale if well protected against loss by first-loss and impact equity.

Thus, before significant private long-term institutional investment funds are likely to be allocated to land restoration and conservation in developing countries, publicly funded entities with a development orientation, such as the new Green Climate Fund (GCF), the International Finance Corporation, the regional development banks, and other multilateral financial institutions equipped to deal with private investors, may need to provide a way to limit risks to private long-term capital.

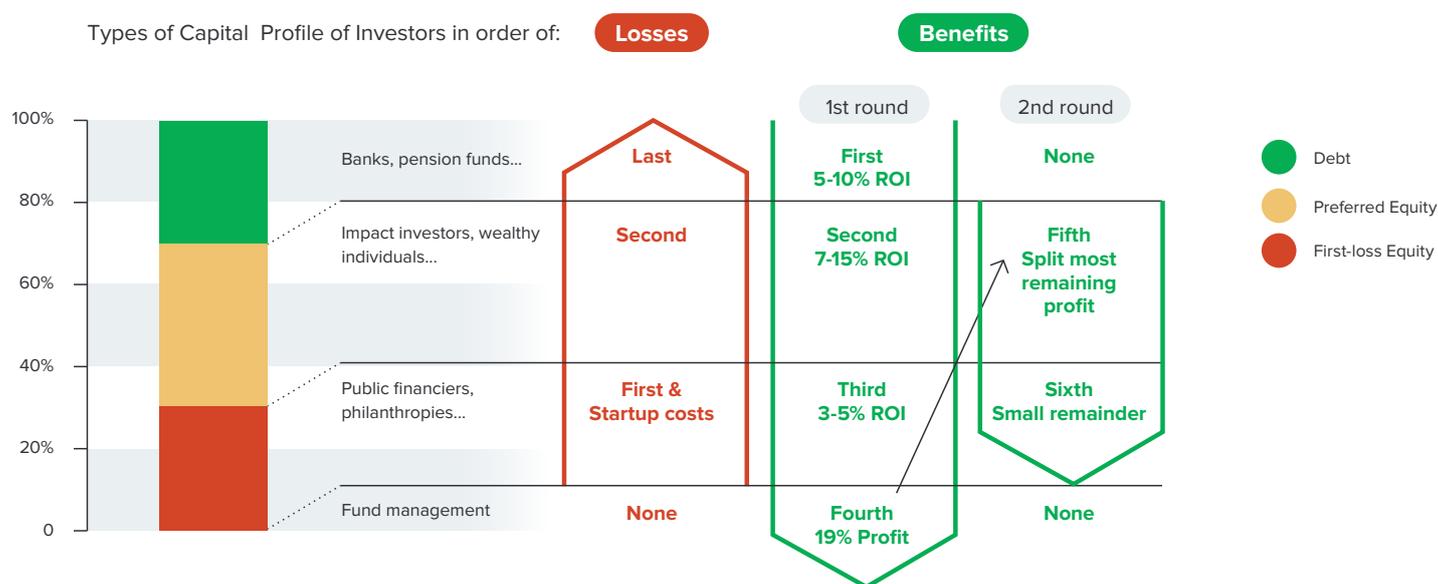
Carbon finance could also be an important source of public funding for delivering desirable public impacts through private actors, particularly on the forest side. The silvopastoralism example from Latin America above demonstrated the key role that carbon markets could also play in facilitating even mainly agricultural – as opposed to forest – restoration. In that case, PES

equivalent to less than US\$4 per tonne of CO₂e was enough to ensure financial viability to farmers, given the public support in helping with the transition to the new production system. Carbon markets and, more immediately, REDD+ payments between governments could play a role in helping finance restoration of whole landscapes. However, most funding for agricultural landscape restoration will likely need to come from public and philanthropic development finance that can leverage a much larger amount of private investment.

4.6 STRUCTURED CAPITAL PARTNERSHIPS TO MOBILISE PRIVATE FUNDS WITH PUBLIC MONEY

Capital stacking, or more formally a form of structured capital partnership, is a common risk-sharing approach in impact investing. As shown in Figure 2, it involves institutional or philanthropic investors typically providing first-loss equity, impact investors providing preferred equity, and private investors more generally providing protected debt equity.¹¹³ Publicly funded institutional investors may be able to leverage private capital on as much as a 10-to-1 basis by accepting as low as a 10% first loss for being the junior equity partner in a stacked capital deal. This implies that the first 10% of overall losses are absorbed by the first-loss investors, with a real chance that they will lose all their money before any of the other investors need to share in the loss. The preferred equity investor is next in line for losses and right behind debt investors for benefits. The debt investor is paid first and is last in line to lose its stake, but has a fixed and generally lower return. This form of stacking has become a relatively common practice, but mainly on small projects and on a case-by-case basis.¹¹⁴ Given the high uncertainties in smallholder agriculture, first-loss guarantees of 25% or higher may be necessary.¹¹⁵ And if first-loss providers cannot reinsure their risks, they will need provision against a full loss, which will quickly use up available capital.

Figure 2
Capital stacking for impact



Note: ROI is the annual return on investment after bridge period.

Source: Consultations with various investors and IMPACTBase, 2015.¹¹⁶

Impact investors as a group seem to be sold on the virtues of first-loss equity capital being provided by institutional or philanthropic investors. Still, there are real questions about where such funds will come from in an adequate amount, and how they can be used most effectively. There are also legitimate worries about possible market distortions and moral hazard¹¹⁷ that must be taken into account in the structuring of investments.¹¹⁸ There is not a lot of experience with large risk guarantee funds working on a multi-project basis across countries. International cooperation that combines impact-oriented multilateral public

funding for mitigating risk with public and private investment for producing impact could help to scale up the amount of total capital for impact considerably. Pooling risks across institutional investors and developing expertise within one facility should result in cost savings. This approach is likely to be most fruitful when it is part of a unified theme, such as land restoration in a given region.¹¹⁹

A common understanding across partners of what constitutes impact is essential for capital stacking to work at scale. The NatureVest survey identified a common concern for both public and private impact investors was the lack of consistency in approaches to evaluate the conservation impact of investments, with a wide range of methodologies used. Some respondents felt that the lack of a common core approach to standards raised the administrative costs of assessing impact and lowered trust among partners.¹²⁰ It will be vital for the impact investing community to come together with its desired institutional partners and other constituencies to better harmonise the agreed standards and indicators of different kinds of impact, monitoring and verification. This task could potentially be carried forward under the auspices of, or in association with, the Global Impact Investing Network.¹²¹ The new Global Alliance on Climate-Smart Agriculture (GACSA) discussed in Section 3 could also be a valuable partner.

4.7 THE IMPORTANCE OF FORMAL TRANSPARENCY, PUBLIC ACCOUNTABILITY AND SAFEGUARDS

Private investors need to worry about transparency and accountability regardless of the presence of public investors in their deals. However, the need is both formalised and made more onerous if public-sector actors are involved. For example, a model of restoration driven only by technical efficiency might seek to move people off the land, introduce land, water and biomass management technologies at large scale, then lease or sell the restored land to commercial interests for use in large-scale sustainable agriculture or sustainable forestry.¹²² However, such an approach could be highly problematic in developing countries. Even if adequate compensation were given, people might not be able to use those funds to build new livelihoods, as they have little education and few alternatives to farming.¹²³ In places with poor governance, people might be displaced with little actual compensation. Where people have clear rights, such as is often the case for indigenous peoples, actionable violations of legal rights could arise.¹²⁴ Clear environmental and social safeguards are critical for both those directly protected and for investors who benefit from a predictable and level playing field.¹²⁵ Adequate consultation processes on the ground with populations directly affected by restoration processes are necessary and helpful.

The sensitivity of these issues came to the fore after the series of food crises starting in late 2007. The Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security, endorsed by the United Nations, were developed over three years by multilateral organisations, governments, the private sector and civil society, driven by concerns about “land grabs” by outsiders in developing countries, as agriculture became much more profitable with higher prices.¹²⁶ The underlying issues of the Voluntary Guidelines were subsequently worked on by the World Bank and relevant United Nations agencies to derive a set of seven Principles for Responsible Agriculture Investment approved by the United Nations Committee on World Food Security in October 2014.¹²⁷

The Global Agricultural and Food Security Program (GAFSP) provides insights on good practice in setting up transparent public-sourced special-purpose funding in a specific and sensitive impact area, where widespread trust is critical to the interest of all. It is a multinational fund (presently funded by nine countries plus the Bill & Melinda Gates Foundation) set up in response to the food crises of the late 2000s. It has a secretariat housed in the World Bank Group, but is externally and evenly governed by its stakeholders (donors, recipients and civil society), who jointly commission independent external advice and evaluations. Projects are implemented by a variety of international financial institutions, at the discretion of the receiving country. They involve a mix of public grants and concessional lending to private actors in 25 low-income countries for a total of more than US\$1 billion.¹²⁸

GAFSP has a robust monitoring and evaluation process that uses experimental methods on roughly one-third of projects, and more modest procedures on the remaining projects; over 2% of all GAFSP funds are used to support continuing independent evaluation of projects.¹²⁹ As the much larger and more complex Green Climate Fund addresses its own need for creating implementation procedures and practices, it is likely to face similar issues as GAFSP. The governance of GAFSP has been held up globally as best practice by individual NGOs and a large coalition of civil society organisations.¹³⁰ Box 1 examines lessons from GAFSP relevant to the issue of building multi-stakeholder trust in new international collaborations.¹³¹

Box 1

Lessons from GASFP for publicly funded multi-stakeholder international impact funds¹³²

Building trust in a sensitive area such as food security or landscape restoration in developing countries requires complete transparency and real balance in governance among the main stakeholders (donors, investors, governments, those on the land now and civil society). Multinational partnerships funded even in part by public treasuries need to be able to explain why they have supported particular countries and projects and not others. Safeguards and consultation procedures with community groups are essential.

GAFSP has the advantage that allocations are handled through existing multilateral development banks or UN agencies dealing with food security, where safeguards and financial procedures are already in place and well monitored for both public and private allocations. Impact investors that want to source funds from any multilateral facility will need similar accreditation. A good vehicle might be consortia of impact investors around specific activities (such as 20x20), with the lead investor going through the accreditation process. As a practical matter, expanding the ability of developing-country entities to originate bankable projects will require public support.

Allocation decisions need to follow agreed standards and rules, and be data-based and technically reviewed for impact. Technical rankings need to be as independent as possible from political forces. This requires structuring the technical appraisal of proposals independently of the governance (allocating) board of a funding facility. This issue has a particular twist for impact funds with public institutional investors as limited partners; the latter will likely want to see technical evaluations of projects done by entities working for them rather than for fund managements.

Access to sensitive deliberative project documents in real time is key for ownership. GAFSP devised a culture where civil society, including representatives of community groups in developing countries, could share all documents and participate in all meetings. This was harder to achieve for private-sector projects because of the concerns of private companies seeking funds to avoid the risk of disclosing proprietary commercial information to competitors, but was achieved with some modifications.

Posting all non-deliberative documentation publicly and in a timely manner is also essential where investing public funds for impact. Loans to private entities need particular rules to allow both transparency and protection of confidential commercial data.

5. Taking action to restore and protect forests while delivering growth

The success of forest conservation efforts depends on whether they can be made to support economic growth. It is not enough for forests to simply *have* great economic value – especially when so much of the value is not remunerated in markets. They must also create value for the people living in and around them, most especially the indigenous peoples and communities that already formally own a significant portion of the world’s tropical forests and have *de facto* possession of much more. Development programmes can introduce new income-generating opportunities from forests that directly benefit these communities. Correcting market failures is also crucial.

Better Growth, Better Climate identifies four key governance principles for the successful management of forest resources for economic and climate benefit. Not only can they make management more effective, but they can also make it pro-growth, by creating new commercial opportunities in the land sector. Taken together, these reforms address the market failures that have allowed deforestation to spread:

Clear land rights: The land use sector functions best when government and society agree on who has the right to control and use what forest and where, and on the rules and institutions that govern access and use. Otherwise different government agencies may have conflicting maps, making it difficult to even know what deforestation is or is not legal. At times, this results in situations such as in Indonesia’s Kepatang district, where logging permits were issued for 3.3 million ha, or 103% of the total land area.¹³³

Respect for customary rights of indigenous peoples: Indigenous peoples and forest communities around the world are losing access to their land, and this threatens their livelihoods and has triggered resource-related conflicts linked to deforestation. When indigenous peoples and local communities possess strong and well-defined land use rights, forests are far likelier to remain standing.¹³⁴ The rates of deforestation in community-controlled forests were one-sixth the rates outside them in Bolivia, one-20th in the Peten, Guatemala, and one-350th in the Yucatan Peninsula, Mexico.¹³⁵ Emerging work also suggests that improved land rights for indigenous peoples promote more sustainable management of forest-related production.¹³⁶

Effective participatory land use planning: Land use planning allows a community or country to guide agricultural development to productive lands where communities desire that development, while protecting areas where forests provide especially significant local and global ecosystem services, including climate protection. In some countries, it balances planned deforestation with offsetting afforestation. Clarity around procedures and land classifications can lower transaction costs and provide certainty to businesses and landowners.¹³⁷

Strong law enforcement: Forest markets cannot function when states do not enforce the laws on the books fairly and equitably.¹³⁸ Private-sector actors are far likelier to invest in places where the government enforces clear and unbiased laws, in part because that means a level playing field for all market participants. One part of Brazil's success in reducing deforestation was increased law enforcement, including the largest enforcement of environmental criminal law in the country's history.¹³⁹

While governance reforms are needed to help overcome market failures and can result in some forest protection, they are not sufficient. Large-scale and durable progress in conserving forests depends on communities and landholders benefiting in a tangible way from forest conservation, which may require policy changes and active investment. Decades of experience point to a wide range of proven implementation approaches that deliver economic benefits to communities while protecting forests. Examples include:

Sustainable forest management programmes implemented through communities: Programmes that support small forest communities to manage forests based on sustainable extraction practices have achieved both forest protection and economic returns. Case studies show strong economic returns to participants from so-called "ejido" programmes in Mexico, for example, where more than two-thirds of forest is now under collective ownership by more than 10,000 communities.¹⁴⁰ These community forests have resulted in significant gains in equity and have created local jobs; the income has been used for community assets such as potable water networks, schools and clinics.¹⁴¹ This system was developed with support from two large-scale World Bank programmes focused on community development, income diversification to include non-timber forest products, education of forestry professionals, and improved project management.¹⁴²

Payments for ecosystem services: PES programmes, already discussed in Section 4, attempt to resolve market failures directly through payments to landholders conditioned on maintaining the environment in a state that provides well-defined environmental services, such as clean water, biodiversity habitat or carbon storage.¹⁴³ Such systems can benefit all if designed well, especially the indigenous peoples and local communities with legal and customary rights to land that are most likely to successfully maintain ecosystems, although they can also be inefficient if poorly designed.¹⁴⁴ Payments for forested watershed protection have been established around the world, including in the three major regions experiencing mass deforestation (Southeast Asia, Central and South America, and the Congo Basin). Watershed PES systems can lead to ecological and economic resilience, greater income, the development of community services, greater biodiversity and improved ecosystem functioning. A review of watershed services payments in Costa Rica and Ecuador found that payments averaged 16% and 30%, respectively, of household incomes.¹⁴⁵ In Tanzania, a PES system was established to alleviate poverty and protect the Saadani National Park.¹⁴⁶ The PES programme has contributed to a significant reduction of wastewater discharges from agriculture and industry and helped improve efforts in community sanitation.

Adopting agroforestry approaches: A growing body of experience illustrates the power of blending agriculture and forestry to restore productivity and ecosystem services in mixed landscapes. The examples discussed in Section 4 show that trees can be an important tool for restoring agricultural productivity. Agroforestry also has the potential to promote economic growth while increasing ecosystem services. A recent review of Global Environment Facility agroforestry projects in Central America and Colombia found project internal rates of return in the 7–13% range without any consideration of environmental benefits, with higher returns if linked PES were included.¹⁴⁷ One agroforestry project in the Philippines improved the food security of farming households by increasing crop and garden yields, while generating up to 137% more income than neighbouring farmers from additional yields and tree products.¹⁴⁸

Developing ecotourism: As a conservation and development strategy, ecotourism offers the chance to create not only alternative income streams, but income streams that rely on intact forests. That fundamentally shifts the economic incentives of local communities toward forest protection. A model of the global potential for tourism markets in developing countries found that, by 2030, 5–8 million low-income households could benefit from payments related to ecotourism.¹⁴⁹

International investments in forest countries can bring both better livelihoods to communities on the ground, and significant emissions reductions. Land use choices will only shift towards enhancing and maintaining, not clearing, forests at the scale needed if the right incentives are in place to make such choices economically rational for individuals, communities, and countries. Increased flows of technical, financial and capacity-building support will be critical to ensure that “stepping stones” such as robust forest monitoring, technologies for enhanced control and surveillance, law enforcement and private-sector engagement are in place. Such support can provide significant incentives for protection. Innovative global partnerships are also emerging that provide economic incentives for forest conservation, and thus additional potential for rapid scaling.

In this section we explore how international cooperation can support an end and reversal of deforestation and forest degradation through financing partnerships built around the system known globally as REDD+: Reducing Emissions from Deforestation and forest Degradation.¹⁵⁰

5.1 REDD+

As noted earlier, there are many economic benefits to conserving and expanding forests. These include significant climate and ecosystem benefits that accrue both to the host country and to the global community as a whole. Without a mechanism to capture some of the value of the benefits to other countries and return them to those countries that need to act to generate them, market failures will result in continued forest losses.

Thus, both tropical forest nations and advanced economies would benefit from a robust global system that supports developing countries seeking to conserve and expand their forests more than they might be able to do alone. Such a system need not completely defray the opportunity costs to individuals of forgoing forest clearing in order for it to yield significant economic benefits at the national scale. Rather, it can help governments that have already decided to protect and promote natural forests to be more effective in doing so, by giving them additional tools to work with the local communities that need to be on board. It can also compensate countries that protect more forests than would be optimal based on the domestic benefits alone.

External finance can help public authorities to establish good governance and the rule of law. This, in turn, can increase the legal, market and reputational costs to those who deforest, and lower the risks to investments in a productive land sector, facilitating the transition toward public policies and private practices that build forest capital. It can also help governments to help farmers and forest-dependent people adopt new practices that conserve, sustain and restore forests. Even small amounts of external financing can provide local populations with tangible financial benefits.

Developing forest countries could also use international support to develop strategies and build the capacity to achieve reductions, to begin implementation of national policies, and to undertake large-scale demonstration activities. Developing nations that can reliably measure, report and verify deforestation reductions could be financed by the international community to maintain global carbon stocks in forests, and at the same time accelerate rural development, alleviate poverty and increase social justice.

Countries have already reached international agreement on the broad framework for this system: REDD+. Since forest countries proposed the idea a decade ago, the international community has agreed that REDD+ can be a useful tool for climate and sustainable development for many countries. Negotiators finalised the key elements of the “REDD+ Rulebook” in a series of decisions at the Warsaw Climate Change Conference negotiations in 2013.¹⁵¹

REDD+ is a system whereby forest countries recognise that it is in their interest to maintain more forests, and are assisted financially by those in the global community who benefit from them doing so. This economic incentive makes some forests easier for governments to protect. The higher the value of climate protection to the world, the more tools and finance governments will be able to use to bring their populations along to conserve more forest.

Carbon payments through REDD+ alone cannot realign the economic incentives that are driving massive global deforestation. For a large middle-income economy such as Indonesia, for example, even billions of dollars in carbon payments would represent a fraction of the land economy: in 2013, Indonesia earned US\$19 billion in export revenue from palm oil cultivation alone.¹⁵²

and US\$8 billion from forest products.¹⁵³ Yet REDD+ payments can be catalytic. They have the potential to shift agricultural production onto already-deforested land, as well as to incentivise forest restoration. Though never intended to be more than an incremental payment, REDD+ could become an important tool to help developing nations to better manage their lands for local and global benefit.¹⁵⁴

The steps from the theory of REDD+ to reality are simple in principle, although they can be technically and politically challenging to achieve and may involve risks. In collaboration with the international community, forest countries proceed through a three-phase approach: i) strategy development and capacity-building, with a particular focus on safeguarding the rights of indigenous peoples and local communities; ii) implementation of national policies and results-based demonstration activities; and iii) results-based actions that are fully measured, reported and verified.¹⁵⁵ In the third phase, funders enter into carbon finance agreements with specific forest countries or regions, committing to a “results-based payment” for emission reductions below an agreed reference level or projected emissions baseline.¹⁵⁶ Results-based payments create economic incentives for actually increasing sequestration and reducing emissions, as payments only go through when emissions actually go down.

Like other PES systems mentioned above, results-based REDD+ works most efficiently and equitably when strong governance is in place, including clear land rights, effective land use planning and strong law enforcement. When governments are committed to forest conservation but these conditions are not yet in place, early-phase REDD+ funding may be directed at programmes and policies to build such capacity and ensure that rights are respected, either before entering into results-based agreements, or as advanced payments within such agreements. Many forest countries and sub-national jurisdictions have started down this path, but many still have a long way to go, so there is room for additional early-stage investments as well as results-based payments. However, payments conditional on successfully reducing emissions have the potential to capture political attention and harness innovation in powerful new ways.¹⁵⁷ They are inherently efficient: if REDD+ programmes fail to deliver large-scale results, the amounts paid will be much smaller.

Results-based payments are not the only way to provide incentives for increased sequestration and emissions reductions from forests, and not every donor and forest country will choose this path. Other financing models, such as traditional development assistance, could also contribute to lower-deforestation rural economic development. To date, just over 40% of the roughly US\$1 billion per year of global REDD+ finance has been pledged on a payment-for-performance basis.¹⁵⁸ However, the common elements of the third phase of REDD+ agreed at COP16 in Cancun are “results-based actions that should be fully measured, reported, and verified”, with later decisions further defining REDD+ measurement, reporting and verification as enumerated in tonnes of emission reductions against a reference level.

Of course, there are significant challenges remaining to work out to bring REDD+ to scale. These include technical issues, such as how and whether degradation can be accurately measured, and political ones such as whether developed countries should be allowed to use market mechanisms to offset emissions at home.

The challenges are surmountable, and many forest countries and jurisdictions are making substantial progress in planning for REDD+, putting into place the capacities to do it well, and undertaking large-scale demonstration programmes. Forty-five countries proposed funding plans to the World Bank’s Forest Carbon Partnership Facility to get ready for REDD+.¹⁵⁹ Eleven of these countries have already presented in-depth and concrete proposals to generate emission reductions and receive results-based payments from the Facility. Seven have signed letters of intent with the Facility, and another three are expected to sign such letters in mid-2015, with these ten countries together delivering 124 million tonnes of emissions reductions in the coming years.¹⁶⁰

International investments in REDD+ are responding to this progress, and in turn contributing additional incentives to turn plans into reality. A pledge of US\$1 billion from Norway to Indonesia has helped to speed governance reforms, a demonstration of how such investments can have leveraged impact.¹⁶¹ A moratorium on clearing forests, and a “One Map” initiative to clarify land holdings, have exposed massive amounts of overlapping and illegal forest holdings, made them publicly transparent for the first time, and facilitated unprecedented opportunities for participation of and recognition of legal rights of indigenous peoples and local communities.¹⁶² Germany has entered into initial agreements with the state of Acre in Brazil, Ecuador, Colombia and Peru.¹⁶³ Germany, Norway and the United Kingdom have jointly committed to establish 20 new programmes by 2016 if robust proposals are tabled, with more to potentially follow.¹⁶⁴

5.2 HOW REDD+ CAN DELIVER BETTER GROWTH

Developing countries have the potential to use climate-based finance for land sector mitigation, such as under REDD+, to fundamentally transform their natural resource economies and make them more productive, sustainable and equitable. Many developing nations have significant amounts of underutilised, environmentally degraded land.¹⁶⁵ Restoring that land into healthy forests and highly productive agriculture in cooperation with local communities would boost economic growth, enhance carbon stocks and, as noted above, take pressure off farmers to convert natural forests for farming.

Every tonne of sequestered carbon achieved through agroforestry, forest planting and natural forest restoration also delivers about US\$74 in additional (non-carbon) net present value through wood production, non-wood forest products, ecosystem services and cultural values.¹⁶⁶ With a cost of such restoration of about US\$1,566 per ha, REDD+ payments of US\$5 per tonne would generate financing of between US\$1,500 and US\$2,500 per ha of protected tropical forests – suggesting that, at these prices, REDD+ may provide the opportunity to fully support the restoration of one hectare of degraded land for every hectare of protected forest.¹⁶⁷

Using REDD+ support to significantly increase the yields of small-scale farmers through smarter use of irrigation, fertiliser and seed technologies is technologically feasible.¹⁶⁸ Doing so could increase rural incomes and help to meet global food needs without deforestation, although some farmers might need to forgo expansion into some potentially productive forest areas.¹⁶⁹ REDD+ systems can also help to create additional incentives, revenue and transparency to tackle corruption and implement governance reforms.¹⁷⁰ REDD+ provides an additional incentive for tropical forest countries to improve rural incomes, natural resource governance, food production and carbon stocks simultaneously.

For their part, developed economies have much to gain by dramatically scaling up international cooperation on forests.¹⁷¹ The international community has set a goal of limiting global warming to 2°C above pre-industrial levels, but countries' pledges in advance of an expected climate agreement to be completed in 2015 at the UN Climate Change Conference in Paris are unlikely to meet that target.¹⁷² While nations are increasing climate action, collectively the world is still not doing enough. By some estimates the gap between the requirements of a 2°C pathway and the emission reductions that nations will pledge in Paris could be at least 10 Gt CO₂e in 2030.¹⁷³ This mitigation gap will require nations to ratchet up their climate ambition over time. While the first priority of advanced economies should be to pursue cost-effective domestic mitigation options, financing mitigation abroad can make an important additional contribution at manageable costs.

Financing mitigation in forest countries may also be an option for the aviation sector. Currently accounting for 5% of global CO₂ emissions, aviation emissions are expected to rise to 10–32% of the total, making it the fastest-growing source of emissions in the global transportation sector.¹⁷⁴ The International Civil Aviation Organization, an agency of the United Nations, is considering market-based measures to help incentivise reductions in the sector. As the aviation sector explores alternative fuels and increases efficiency, offsetting emissions through REDD+ could be a near-term option.

Over the past five years, a number of tropical forest nations have entered into REDD+ agreements with developed nations and multilateral development banks with explicit carbon prices. Brazil, Guyana, Guatemala and Peru have all used a carbon price of US\$5 per tonne, and Indonesia is moving in that direction.¹⁷⁵ As an illustrative example, if tropical forest nations self-financed half of the reduction, and REDD+ agreements provided payment for the rest at this indicative price, reducing deforestation in half by 2020 would require a total of US\$8–25 billion,¹⁷⁶ or in the range of US\$5 billion per year of REDD+ finance in 2020. Ending deforestation by 2030 would require in the range of US\$10 billion per year of REDD+ finance in 2030. While not trivial, these sums would be manageable with a significant increase in public and/or private investment in international climate cooperation.

The potential scale of REDD+ mitigation – both avoided emissions and increased sequestrations – is enormous. Several forest countries have already set ambitious emission targets conditioned in part on receiving REDD+ payments.¹⁷⁷ If fully financed, these existing forest goals alone would achieve 1.9 billion tonnes of CO₂e of forest emission reductions by 2020, avoiding emissions through protection of 2.5 million ha every year and increasing sequestration through restoration of another 1.6 million ha, for a total area the size of the Netherlands.¹⁷⁸ Many other forest nations have yet to articulate emission reduction goals, and will do so before the Paris Climate Change Conference. Several nations made commitments at the Lima Climate Change Conference in 2014 to accompany ambitious self-financed action with clear offers of additional forest-sector mitigation conditional on finance.

6. The power of supply chain agreements

While REDD+ has the potential to provide large-scale public-sector incentives for forest conservation, the private sector is responding to demand for sustainable growth with new forms of international, multi-stakeholder cooperation for forests that provide a complementary set of incentives. More than 70% of global deforestation is associated with the expansion of commercial agriculture.¹⁷⁹ A number of major global corporations, in response to local communities, indigenous people, and both local and global NGOs, are now moving to use their purchasing decisions to incentivise sustainable production of commodity crops such as palm oil, soy, beef and pulp and paper – whether they are destined for domestic markets or international trade.¹⁸⁰ This new “supply chain revolution” has the potential to shift commodity purchasing from a cause of deforestation to a driver of solutions.

6.1 THE FOREST-AGRICULTURE SUPPLY CHAIN REVOLUTION

The roots of change in supply chain approaches to deforestation can be traced to the communities most impacted by deforestation. In Brazil, for example, stepped-up enforcement of the national laws governing agricultural expansion into forests can be traced directly back to the protests of forest peoples’ movements, such as the rubber tappers’ union led by Chico Mendes, and the impacts they had on Brazilian national politics.¹⁸¹ Local and global NGOs, including biodiversity, environmental and rights-based groups, spent many years amplifying these protests and bringing the action to companies along the supply chain.

These movements, often supported by market-focused campaigns by global NGOs such as Greenpeace, eventually led to large-scale and global attention. In 2010, the Consumer Goods Forum (CGF) – an industry association representing consumer-facing companies with more than US\$3 trillion in annual revenues – pledged to eliminate deforestation from its supply chains and achieve “zero net deforestation” by 2020.¹⁸² As already noted, this CGF pledge was a primary driver of the 2012 creation of the Tropical Forest Alliance 2020 (TFA), a shared multi-stakeholder platform, including governments, companies and NGOs, to eliminate commodity deforestation.

These partnerships are contributing to an important second “green revolution” in global agriculture. Where the first green revolution in the 1960s helped to feed the world by increasing crop yields through new seed technologies, the second green revolution is positioned to help make global agriculture more sustainable.¹⁸³

Over the past two years, most of the world’s major commodity traders – large agribusinesses such as Wilmar, Cargill and Archer Daniels Midland that dominate global agricultural trade – have committed to zero-deforestation policies. The shift has been most rapid in the palm oil industry (see Box 2). While each company’s policy has its nuances, the overall commitment is simple: neither the world’s largest agricultural traders nor their major customers (global consumer goods companies) will buy agricultural commodities grown on recently deforested land. In 2014, the *New York Times* called Cargill’s pledge “one of the most sweeping environmental pledges ever made by a large agricultural company”.¹⁸⁴

The collective pledge by the CGF, the launching of the TFA and the cascade of commitments to zero-deforestation policies are very significant. The task now is to make the vision of deforestation-free commodities a reality. Pledges need to translate into effective actions, ranging from building internal company support, to creating and sharing plans with aggressive timelines, to exposing sourcing relationships to outside scrutiny through increased transparency, to transmitting strong incentives for deforestation-free goods from buyers to sellers, to engaging outside parties to verify company policies are being met.

Box 2

Palm oil and corporate commitments

Palm oil is an inexpensive and highly versatile oil derived from the fruit of the oil palm tree. It is found in many consumer goods, from foods such as baked goods and chocolate, to household goods including soaps, lotions and detergents.¹⁸⁵ Due to its high yields, multiple uses and concentrated production in just a few tropical countries, 90% of global palm oil production is traded on the world market.¹⁸⁶

For decades, however, the palm oil business has been linked to corruption, social injustice and deforestation.¹⁸⁷ Government officials in Southeast Asia have a history of granting oil palm growers legal concessions for clearing forests without considering the customary rights of communities who are often forced off their land.¹⁸⁸ The communities have not stood idly by: in 2012, 59% of Indonesia's 1,000 palm oil companies were linked to land conflicts in which local communities reacted violently, took companies to court or otherwise protested against new plantations.¹⁸⁹

However, change is on the horizon. In December 2013, the world's largest palm oil trader, Wilmar International, introduced a ground-breaking "No Deforestation, No Peat Land, No Exploitation" commitment across its entire supply chain. Since then, other major commodity and consumer goods companies have pledged to break the link between palm oil and deforestation, while also protecting the rights of local communities. Today, more than 90% of globally traded palm oil is covered by responsible sourcing guidelines.

6.2 THE ROLE OF GOVERNMENTS IN DELIVERING ON ZERO-DEFORESTATION COMMITMENTS

Commodity producers need the full partnership of forest country governments to deliver the zero-deforestation goods they have pledged. Voluntary business commitments are a major step, but government policies are necessary to help deliver on their promise. Below we describe some key elements of successful approaches.

Maps, rights, and accountability: The numerous conflicting maps, rules and regulations related to forests, combined with secretive and often inconsistent decision-making and rule changes at different levels of government, create opportunities for confusion and corruption. Producer country governments need to provide greater clarity and accountability by recognising indigenous land rights, resolving competing land claims and reducing fraud through transparency and accountability. Indonesia's One Map initiative is an example, with the federal government collecting maps of concessions, indigenous land claims and protected areas, and working to reconcile conflicting claims while increasing local accountability. Land use planning and mapping processes such as this can ultimately identify "go" and "no-go" zones to drive zero-deforestation agriculture investment.

Protect vulnerable communities: Companies and governments can work together to ensure free, prior and informed community consent in areas targeted for agricultural development and intensification. This is especially important as production shifts from sparsely populated forests to more densely settled degraded lands. When there is conflict, it is the role of governments to provide communities access to solid mechanisms for dispute resolution. Governments protect communities when, for example, they include them in formal consultation processes during land use planning, and when the process for granting land concessions for agricultural development includes clear and well-enforced requirements for community consultation.

Radical transparency and traceability: Much of the responsibility for transparency lies with commodity producers themselves, but governments have a clear role to play in mapping, improving forest monitoring systems and making their own data public. Effective law enforcement may require that mills, slaughterhouses and grain terminals document the geographic source of their products. While some private companies may undertake voluntary supply chain tracing, government rules could require such documentation directly. Companies and civil society will only be able to monitor whether land use policies and laws are followed if governments are fully transparent in their processes for granting land use rights. The Brazilian government, for example, has linked access to agricultural credit to the registration of private property boundaries, in order to more transparently link satellite observations to specific landowners and their compliance with forest cover requirements.

Support for smallholder farmers: Smallholders are at risk of being cut out of global markets if the cost of meeting supply chain standards is too high. Major companies often have an interest in keeping smallholders engaged and part of their supply chains. In places such as Indonesia, they are required to maintain a specific percentage of land as smallholder developments in

order to obtain palm oil concessions. But even when not required, smallholder engagement affects the distributional benefits of agricultural development, which can in turn reduce conflict, avoid reputational risk and maintain the private sector's social licence to operate. Local enterprises and small businesses may need support to meet the demands of responsible sourcing guidelines, which government can provide through training, outreach and support to farmers, and support for collective certification.

6.3 INTERNATIONAL COOPERATION FOR SUSTAINABLE SUPPLY CHAINS

Agriculture and forestry products reach consumers via a complex web of trading partners and businesses that cut across political, cultural and economic boundaries. Forest country producers, national governments, companies and global trading partners thus have an important role to play in supporting the forest conservation goals of forest nations. The following three forms of international partnerships on forests are essential to achieving deforestation-free supply chains.

Strengthening international demand for deforestation-free commodities

Nations that import agricultural commodities that frequently cause deforestation could help forest countries to achieve their forest conservation goals by ensuring that international trade is both legal and sustainable. The United States and Europe, for example, have laws against the importation of illegal timber and wood products – i.e. forest products created in violation of domestic laws in forest countries. Together with improved governance and law enforcement in countries where forest-based products originate, it is estimated that these consumer country trade laws have helped to prevent more than 100 Mt of CO₂ emissions annually, at a cost of less than US\$2.50 per tonne.¹⁹⁰ Advocates are calling on advanced economies to expand these laws to all agricultural commodities, so that beef, soy, paper and palm oil produced in violation of national laws could be excluded from international trade. Doing so would remove major economic incentives for illegal deforestation and land conversion to agriculture.¹⁹¹

Advanced economies could also support sustainable producers in forest nations by ensuring that publicly procured commodities are grown without harming forests. The British government, for example, has recently committed to deforestation-free procurement for products that include palm oil and wood.¹⁹² If all importing countries – or at least all developed countries that endorsed the New York Declaration on Forests – adopted these sorts of procurement standards across all commodities, it would align public spending with stated public policy goals on forests and climate change, and leverage government buying power to support the sustainable producers seeking to transform forest country agricultural sectors.

Supporting transparency and accountability

As noted above, eliminating deforestation from commodity production requires greater transparency in global commodity markets and supply chains. As a practical matter, the most cost-effective and accurate systems require international cooperation. Thus the developed world has a role to play here, too. The US Landsat earth observation satellite programme has provided more than four decades of continuous land monitoring data, which underlie the most cutting-edge global forest monitoring sources.¹⁹³ Public-sector finance from the UK, US, Norway, Sweden, the Netherlands, Denmark and the Global Environment Facility is supporting the integration of remote sensing data with supply chain data, direct user inputs and a range of other sources (many developed with public finance as well) into Global Forest Watch, an interactive online near-real-time forest monitoring and alert system.¹⁹⁴

Fully integrating supply chain data into these sorts of global monitoring systems requires effective chain-of-custody tracking systems for commodities. Such systems are well developed for wood in many parts of the world, but lag behind for agricultural commodities such as soy, beef and palm oil. Advanced economies could help to make existing tracking systems more effective – for example, by partnering with forest countries and companies to pilot chain-of-custody systems in global deforestation hotspots.¹⁹⁵

Supporting strong country leadership for sustainable development

As noted in Section 5, developed nations could help forest nations lower emissions from forests by creating economic incentives for forest restoration and conservation, including REDD+ assistance and results-based payments. When directed to jurisdictions that are pursuing ambitious programmes to eliminate deforestation from commodity supply chains, these economic incentives and foreign assistance programmes can help to ensure that sustainable commodity practices benefit local communities and accelerate economic growth.¹⁹⁶ Internationally supported governance reforms encourage sustainable production, and foreign aid programmes relating to community forest management and agroforestry have in several instances increased the supply base of certified sustainable goods.¹⁹⁷ Development assistance programmes directed at smallholders can help them gain access to international markets for deforestation-free commodities. International financial institutions can adopt and spread zero-deforestation lending and investment policies, which some leading private-sector banks are spearheading.¹⁹⁸

Box 3

Slowing forest loss in Brazil

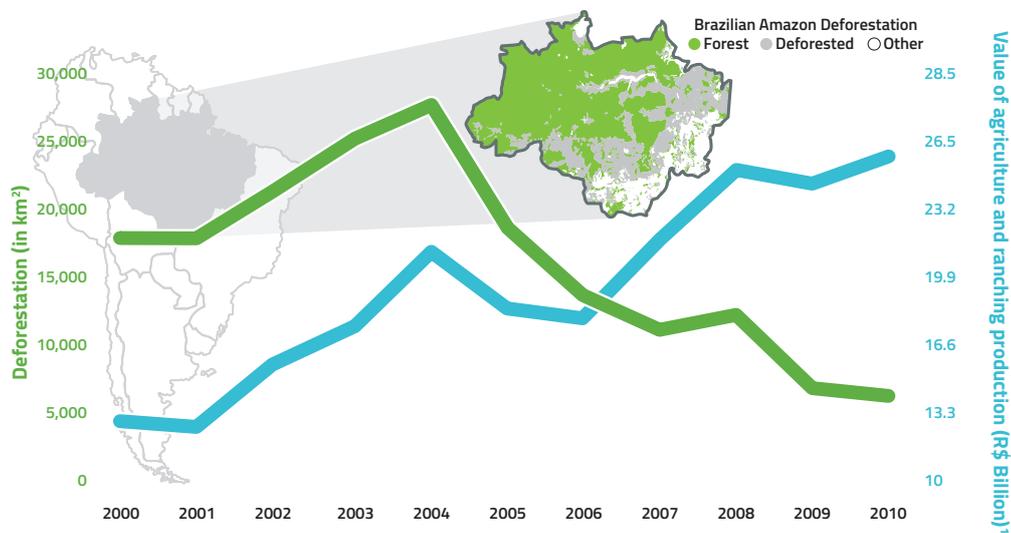
Over the past decade, Brazil has reduced greenhouse gas emissions more than any other nation, primarily by reducing deforestation in the Amazon.¹⁹⁹

From historic highs in the early 2000s until today, Brazil reduced forest loss in the Amazon by more than 75% below the 1996–2005 average.²⁰⁰ This reduction in Amazon forest loss happened during a period of rapid agricultural growth and increasing rural incomes,²⁰¹ and although forest loss has increased since the minimum seen in 2012,²⁰² the increase is small relative to historical rates of forest loss.

Several factors contributed to this success, including an ambitious law enforcement effort – guided by real-time satellite monitoring – that led to the arrest of thousands of illegal loggers and land speculators. The government also protected vast areas of forest by designating them as national parks and indigenous territories, and linked billions of dollars in agricultural credit to counties’ performance on deforestation.²⁰³

Public-sector efforts were complemented by civil society and corporate action. Spurred by indigenous communities, international NGO campaigns and demands from commodity buyers, soy producers in Brazil agreed to a voluntary “deforestation moratorium” in 2006. Beef producers followed suit in 2009.²⁰⁴ International climate investments also played a role: Brazil established its Amazon Fund in 2009 with contributions from Norway, Germany and others, helping to support forest-friendly growth in the region.²⁰⁵

Figure 3
Agricultural production uncouples from deforestation



Paradigm Shifters



Mobilization of Civil Society: Brazilian NGOs and social movements mobilize and coordinate to pressure government and the private sector to address deforestation in the Amazon.²



Monitoring and Enforcement: “Whole-of-government” approach to control deforestation—including real-time satellite imagery, coordinated policy action against environmental crimes, high-profile prosecutions of corruption and fraud, and black-listing of the worst municipalities.³



Legal Designation of Indigenous Territories and Protected Land: More than half of the Brazilian Amazon under legally protected status by the end of 2020, including over 1 million square kilometers reserved for indigenous communities.⁴



Zero-Deforestation Commodities: Highly successful sectoral moratorium on deforestation for soy production since 2006. Beef moratorium initiated in 2009.⁵

Source: Barreto, P. and Silva, D. (2013).²⁰⁶

7. Conclusions and recommendations

Robust growth in global demand for agricultural and forest products over the last few decades, combined with market and governance failures, have resulted in large-scale degradation of agricultural landscapes and forests, at a cost of up to US\$120 billion per year.²⁰⁷ This cost is borne in the first instance by developing countries, although the ecological and climate impact is global, even if not immediately monetised. Solutions require a joint approach across land use sub-sectors to achieve synergies and avoid conflicts. As such, a common and integrated landscape approach under national coordination is needed to address resource conservation and restoration while boosting efficiency and productivity.

Stronger international cooperation would help countries to accelerate economic growth, while delivering important climate benefits for the world. Global climate finance support should be prioritised for countries that have taken significant steps to preserve natural forest capital. This follows the principle that national political will is a prerequisite to dealing with the major market failures and externalities inherent in land use, especially in developing countries. Nations, companies and communities should in particular prioritise cooperation in three areas: restoring productive whole landscapes, conserving natural forests and encouraging deforestation-free supply chains.

The Commission therefore recommends that governments, multilateral and bilateral finance institutions, the private sector and willing investors work together to scale up sustainable land use financing, towards a global target of halting deforestation and putting into restoration at least 500 million ha of degraded farmlands and forests by 2030. Developed economies and forested developing countries should enter into partnerships that scale up international flows for REDD+, focused increasingly on mechanisms that generate verified emission reductions, with the aim of financing an additional reduction of 1 Gt CO₂e per year from 2020 and beyond. The private sector should commit to extending deforestation-free supply chain commitments for key commodities and enhanced financing to support this.

Collectively, we estimate that these efforts can lead to increased sequestration and emission reductions of 3.3–9.0 Gt CO₂e in 2030, while making agriculture more productive and resilient, and boosting the incomes of agrarian and forest communities in developing countries.

7.1 LANDSCAPE RESTORATION

Large-scale restoration of degraded rural landscapes with a mix of agricultural, agroforestry and forest investments is essential to achieving both major climate and development goals. High-level commitment that transcends narrow sectoral interests is essential. International public and philanthropic capital will be needed to work in partnership with different kinds of national public capital and private capital, to build capacity, provide start-up finance and take first-loss risks. Given an estimated overall need of about US\$250 billion per year in landscape investments in developing and emerging economies as demonstrated above, at least US\$25 billion per year in public funding is likely to be needed to leverage adequate private contributions for risk protection and start-up costs, and possibly twice this amount. Much more needs to be done to support large public–private partnerships to scale up these efforts.

In particular, progress is needed on the following:

- Extend good practice from regional partnerships that are particularly effective at building political legitimacy and high-level support for accelerated implementation, such as Initiative 20x20 in Latin America. This involves combining high-level commitments from leaders with detailed cross-sectoral plans for implementation involving all the main stakeholders. The financial architecture that makes it possible depends on correctly structuring risks and returns across stakeholders on the ground, investors for income, investors for capital appreciation and investors for impact. The latter group will also need to include development finance or philanthropic institutions willing to build specialised capacity, provide concessional start-up capital and countenance first-loss risks in order to leverage significant further investment capital for impact from the private sector.
- Given the key role of public finance in successfully mobilising private investment at scale, donor governments and philanthropic organisations should create a substantial dedicated global facility or facilities (such as new windows of existing funds) for public co-financing of landscape restoration and conservation, leveraging private investment as noted above. Adequate attention and finance should be provided to building capacity to formulate bankable projects. Transparency and inclusion are also key to the sustainability of using multilateral public funding for impact achieved through private enterprise. The experience of the Global Agricultural and Food Security Program provides particular insight.

- Impact investors should discuss together, and with public institutional investors, national governments in developing countries, technical agencies and civil society, the necessary safeguards and appropriate indicators for productive landscape restoration, especially when using public funds. Safeguards and common standards of impact are essential to increased international collaboration here. These safeguards and standards should draw on current industry standards for forests and the work in this regard for agriculture by the Global Impact Investors Network and the Global Alliance for Climate-Smart Agriculture.
- At the same time, governments, multinational corporations and international civil society should actively seek to strengthen international platforms for increasing high-level commitment to restoration of degraded landscapes, including through linking forest and agricultural restoration platforms. There is also a need to improve consensus on feasible options for implementation. On the agriculture side, this could be through the Global Alliance for Climate-Smart Agriculture. On the forest side, this could be through the Global Partnership on Forest and Landscape Restoration.

7.2 FOREST CONSERVATION

Advanced economies and forested developing countries should enter into forest partnership agreements to scale up international flows for REDD+, focused increasingly on mechanisms that generate verified emission reductions, with the aim of financing an additional 1 Gt CO₂e per year in emission reductions and increased forest sequestration in 2020 and beyond.

International partnerships at this scale can realign economic incentives in favour of forest conservation and help to unlock the full potential of the land use sector so as to enhance economic growth, livelihoods, food security and climate protection. Such partnerships achieve this by helping to catalyse and support land use planning, policy and governance reform in forest countries, and by providing direct incentives that change people's and governments' land use decisions by making forest protection economically rational. The result is good land governance that protects communities' customary land rights while growing private-sector investment and rural economies. At the same time, healthy forests clean the air, filter water, regulate the weather and provide a direct income from forest products.

To make near-term progress towards this vision, developed and developing nations should work together now to announce a number of these forest partnerships as early as possible, ideally at the Climate Change Conference in Paris. This would demonstrate the role that international forest partnerships can play in narrowing the global emissions mitigation gap, show a serious commitment to halving natural forest loss by 2020, and position forest conservation as a central element of international climate diplomacy in the period following the Paris conference. Key actions include:

- Forest countries should identify ambitious national forest goals, clarifying the portion of emission reductions they intend to self-finance and the portion requiring international incentives.²⁰⁸
- Developed economies should collectively commit to provide economic incentives to help to achieve additional emission reductions of 1 Gt CO₂e per year from forests.
- Each developed economy should indicate how it intends to meet its share of the collective 1 Gt CO₂e commitment.²⁰⁹ New international forest pledges by advanced economies should supplement not weaken their domestic mitigation commitments.
- Partnering nations should set the concrete terms of their international forest conservation partnerships with high standards for social justice and environmental integrity and explicit economic incentives for action.
- In addition, to the extent that carbon offsets are included in the International Civil Aviation Organization's planned market-based mechanism to achieve carbon neutral growth after 2020, REDD+ should be included as well, with robust rules and baselines.

7.3 SUPPLY CHAINS

A major transformation of global supply chains is under way. Major consumer goods companies, commodity traders and banks should implement and expand commitments to eliminate deforestation in the global trade of agricultural commodities to cover all major commodity markets, commodity-growing countries and consumer outlets. As part of an ambitious new global multi-stakeholder partnership, private-sector commitments create economic incentives for forest countries to manage lands for greater

agricultural productivity as well as better development and climate outcomes, while ensuring companies' ability to sustainably meet growing global demand for food, feed and fibre. The following actions would advance supply chain commitments:

- Companies should implement their pledges fully and transparently. This includes setting clear public goals, backing them up with near-term action plans that are publicly released, making supply chain information transparent to all, investing in supplier relationships in order to increase productivity and market access for small-scale farmers to make sure they can join the global market for sustainable commodities, and switching suppliers when necessary to weed out non-complying actors.
- Companies should advocate for the governance reforms and international incentives needed to help meet their zero-deforestation pledges. This includes calling for: (i) rational and transparent land-use planning reforms to protect high value forests; (ii) environmentally degraded lands to be made available for new agricultural production; and (iii) legal frameworks and rule of law to be strengthened in the natural resource sector.
- In tandem with these corporate actions, forest country governments should help communities and companies to achieve zero-deforestation supply chain goals by clarifying land tenure, recognising the rights of indigenous communities, including to land, promoting supply chain transparency and helping smallholders increase productivity and gain access to rapidly expanding global markets for sustainable commodities.
- To advance the supply chain transformation, along with its attendant climate and development benefits, developed nations should create strong economic incentives for forest nations to eliminate deforestation from supply chains, including through REDD+ payments and foreign assistance, as well as forest-friendly procurement policies, trade liberalisation and increased foreign investment for deforestation-free commodities.

ENDNOTES

- ¹ The Global Commission on the Economy and Climate, 2014. *Better Growth, Better Climate: The New Climate Economy Report*, Chapter 3 “Land Use”. New York. Available at: <http://2014.newclimateeconomy.report/land-use/>
- ² We assume the population growth rate to 2040 to be 0.86% per year, following the UN’s medium-variant estimate to 2050. Similarly, the urban population is projected to grow about 1.6% per year over this period, and this can be used as a proxy for growth of the middle class to a lower bound of 3 billion. An upper bound is derived from an OECD estimate of 4.9 billion middle-class people in 2030. The central tendency of 4 billion seems reasonable, recognising the uncertainties in predicting global household income distribution patterns 15 years in advance.
- See: United Nations, 2012. *World Population Prospects: The 2012 Revision*. UN Department of Economic and Social Affairs, Population Division, New York. Available at: <http://esa.un.org/unpd/wpp/>.
- For the OECD estimate, see: Pezzini, M., 2012. An emerging middle class. *OECD Yearbook 2012*. Available at: http://www.oecdobserver.org/news/fullstory.php/aid/3681/An_emerging_middle_class.html.
- ³ Searchinger, T., Hanson, C., Ranganathan, J., Lipinski, B., Waite, R., Winterbottom, R., Dinshaw, A. and Heimlich, R., 2013. *Creating a Sustainable Food Future: A Menu of Solutions to Sustainably Feed More than 9 Billion People by 2050*. World Resources Report 2013–14: Interim Findings. World Resources Institute, the World Bank, United Nations Environment Programme, and United Nations Development Programme, Washington, DC. Available at: <http://www.wri.org/publication/creating-sustainable-food-future-interim-findings>.
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- WWF, 2012. Chapter 4: Forests and Wood Products. In *WWF Living Forest Report*. World Wide Fund for Nature, Washington, DC. Available at: http://wwf.panda.org/about_our_earth/deforestation/forest_publications_news_and_reports/living_forests_report/.
- ⁴ Agriculture data are from: OECD and FAO, 2013. *OECD-FAO Agricultural Outlook 2014–2023*. Organisation for Economic Co-operation and Development, Paris, and Food and Agriculture Organization of the United Nations, Rome. Available at: http://dx.doi.org/10.1787/agr_outlook-2014-en.
- Forest data are from: FAO, 2014. *State of the World's Forests 2014*. Food and Agriculture Organization of the United Nations, Rome. Available at: <http://www.fao.org/3/a-i3710e.pdf>.
- Also see: The World Bank, 2007. *World Development Report 2008: Agriculture for Development*. Washington, DC. Available at: <http://go.worldbank.org/H999NAVXGO>.
- International Sustainability Unit, The Prince’s Charities, 2015. *Tropical Forests: A Review*. London. Available at: <http://www.pcfisu.org/wp-content/uploads/2015/04/Princes-Charities-International-Sustainability-Unit-Tropical-Forests-A-Review.pdf>.
- ⁵ Emissions from agriculture, forests and other land use change (AFOLU) are estimated at 12 Gt CO₂e in 2010, 24% of total GHG emissions that year. See: IPCC, 2014. Summary for Policymakers. In *Climate Change 2014: Mitigation of Climate Change*. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner et al. (eds.). Cambridge University Press, Cambridge, UK, and New York. Available at: <https://www.ipcc.ch/report/ar5/wg3/>.
- ⁶ This estimate covers only the value of the net annual economic loss from new degradation, not the much larger value of annual production or the cumulative loss over years. It is the sum of a cost estimate for soil degradation from the Food and Agriculture Organization of the United Nations (US\$40 billion per year), and applying an estimated value of US\$3,100 to US\$6,120/ha to an FAO estimate of 13 million ha gross deforestation annually, yielding US\$40 to US\$80 billion for forest degradation.
- See: FAO, n.d. Land degradation assessment. Food and Agriculture Organization of the United Nations. Available at: <http://www.fao.org/nr/land/degradation/en/> [accessed 7 August, 2015].
- FAO, 2010. *Global Forest Resources Assessment 2010*. FAO Forestry Paper 163. Food and Agriculture Organization of the United Nations, Rome. Available at: <http://www.fao.org/forestry/fra/fra2010/en/>.
- The per hectare estimates are from: TEEB, 2010. *The Economics of Ecosystems and Biodiversity Ecological and Economic Foundations*. Edited by Kumar, R. Earthscan, London and Washington. Available at: <http://www.teebweb.org/publication/the-economics-of-ecosystems-and-biodiversity-teeb-ecological-and-economic-foundations>.

Costanza, R., de Groot, R., Sutton, P., van der Ploeg, S., Anderson, S.J., Kubiszewski, I., Farber, S. and Turner, R.K., 2014. Changes in the global value of ecosystem services. *Global Environmental Change*, 26. 152–158. DOI:10.1016/j.gloenvcha.2014.04.002.

The International Resource Panel Report (in conjunction with UN REDD+) at: <http://www.un-redd.org/IRPReport/tabid/132330/Default.aspx>.

TEEB, 2009.

⁷ FAO, 2013. *Sourcebook on Climate-Smart Agriculture, Forestry and Fisheries*. Food and Agricultural Organization of the United Nations, Rome. Available at: <http://www.fao.org/docrep/018/i3325e/i3325e.pdf>.

⁸ FAO, 2013. *Sourcebook on Climate-Smart Agriculture, Forestry and Fisheries*.

⁹ See: <http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/New-York-Declaration-on-Forest-%E2%80%93-Action-Statement-and-Action-Plan.pdf> [accessed 6 August 2015]. The restoration component of the New York Declaration extends the 150 million ha global restoration target for 2020 of the 2011 Bonn Challenge to 350 million ha by 2030. The global goals of the New York Declaration and Bonn Challenge are being carried forward through individual country and regional pledges and partnerships. For example, as of August 2015, nine countries, two partnerships and a Pakistani province had made restoration commitments covering a total of 59.6 million ha (see: <http://www.bonnchallenge.org>), while countries such as Colombia and Peru have pledged zero deforestation target dates (see: http://www.wwf.org.uk/research_centre/?7602/Plans-to-cut-deforestation-need-to-aim-higher), and many individual companies and industry groups have committed to eliminating deforestation from their supply chains by 2020 (see: <http://supply-change.org/>).

¹⁰ See: <http://www.fao.org/gacsa/members/en/>.

¹¹ See: <http://www.wri.org/our-work/project/initiative-20x20> [accessed 18 November 2015].

¹² See: <http://www.csaforafrica.org>.

¹³ Unless otherwise indicated, data and issues are from *Better Growth, Better Climate*. The land area totals in 2012 are from [www.FAOSTat3.fao.org](http://www.fao.org/3/a-i4793e.pdf) for crops and pastures; for forests it is from FAO, *Global Forest Resources Assessment 2015*, available at <http://www.fao.org/3/a-i4793e.pdf>. The percentage of degraded cropland in 2012 is from an earlier estimate in FAO, *The State of Land and Water Resources 2011*, available at: <http://www.fao.org/docrep/017/i1688e/i1688e.pdf>. Degraded forest area is approximated by the ratio of forest and wooded areas other than “natural forest” to total forest in the FAO *Global Forest Resources Assessment 2015*. “BAU 2030” is obtained by straight-lining to 2030 the observed annual changes in land use 2000–2012 in the above FAO sources.

¹⁴ FAO, 2011. *The State of the World’s Land and Water Resources for Food and Agriculture (SOLAW) – Managing Systems at Risk*. Food and Agriculture Organization of the United Nations, Rome. Available at: <http://www.fao.org/nr/solaw/>.

¹⁵ UNCCD, 2012. *Desertification Land Degradation & Drought (DlDD) – Some Global Facts & Figures*. United Nations Convention to Combat Desertification. Available at: <http://www.unccd.int/en/programmes/Event-and-campaigns/WDCD/Documents/DLDD%20Facts.pdf>.

¹⁶ FAO, n.d. Land degradation assessment.

¹⁷ See: <http://www.un.org/waterforlifedecade/scarcity.shtml> [accessed 14 August 2014].

¹⁸ IPCC, 2014. Technical Summary. In *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. C.B. Field, V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastandrea, et al. (eds.). Cambridge University Press, Cambridge, UK, and New York. Available at: <https://www.ipcc.ch/report/ar5/wg2/>.

¹⁹ FAO, 2011. *The State of the World’s Land and Water Resources for Food and Agriculture*.

UNCCD, 2012. *Desertification Land Degradation & Drought (DlDD) – Some Global Facts & Figures*.

Also see: Cervigni, R. and Morris, M., 2015. *Enhancing resilience in African drylands: toward a shared development agenda*. The World Bank, Washington, D.C. Available at: http://www.worldbank.org/content/dam/Worldbank/document/Climate/Climate%20and%20Poverty%20Conference/D1S4_Cervigni_African%20Drylands%20CC%20Poverty%20Conference_A.pdf.

Degradation of whole forests in developing countries, however, is overwhelmingly associated with large-scale logging and a mix of commercial and subsistence agriculture. See: Kissinger, G., Herold, M. and de Sy, V., 2012. *Drivers of Deforestation and Forest Degradation: A Synthesis Report for REDD+ Policymakers*. Lexeme Consulting, Vancouver. Available at: <https://www.gov.uk/government/publications/deforestation-and-forest-degradation-drivers-synthesis-report-for-redd-policymakers>.

- ²⁰ As in Rwanda where the large majority of the population derives its livelihood from farming, but arable land per inhabitant was only 0.11 ha in 2011–2015. See: <http://data.worldbank.org/indicator/AG.LND.ARBL.HA.PC>.
- ²¹ Deforesting organic soils (such as peatland) can lead to especially high emissions per hectare. See: <http://www.wetlands.org/Whatarewetlands/Peatlands/Carbonemissionsfrompeatlands/tabid/2738/Default.aspx>.
- ²² See: Kissinger et al., 2012. *Drivers of Deforestation and Forest Degradation*.
- ²³ See: <http://www.fao.org/agriculture/lead/themes0/deforestation/en/>.
- ²⁴ Sparks, D., 2003. *Environmental Soil Chemistry 2nd ed. Elsevier*. Available at: <http://www.sciencedirect.com/science/book/9780126564464>.
- ²⁵ Hansen, M., University of Maryland and Google Earth at Global Forest Watch, 2015. New 2013 Data. Available at: <http://www.globalforestwatch.org>. Here “loss of tree cover” is defined as areas that were above 30% canopy cover going to below that level. The loss is “gross” in that remote sensing has difficulty detecting regenerating forest on an annual basis.
- ²⁶ FAO, 2015. *Global Forest Resources Assessment 2015: How are the world's forests changing?* Food and Agricultural Organization of the United Nations, Rome. Available at: <http://www.fao.org/3/a-i4793e.pdf>.
- ²⁷ This is based on the period 1961 to 2012, inclusive. See: <http://faostat3.fao.org/faostat-gateway/go/to/browse/R/RL/E> [accessed 14 August 2014].
- ²⁸ Lawson, S., 2014. *Consumer Goods and Deforestation: An Analysis of the Extent and Nature of Illegality in Forest Conversion for Agriculture and Timber Plantations*. Forest Trends, Washington, DC. Available at: http://www.forest-trends.org/documents/files/doc_4718.pdf.
- Deforestation is technically defined as a change in land use, from forest to another purpose. If a forested area is cleared but not converted to another use, but rather left to regenerate, it is called degraded, not deforested.
- ²⁹ Given the technical definition of deforestation noted above, it is easy to see why agriculture is the main driver of deforestation in the sense of a change of land use once trees are removed; non-agricultural uses such as mining, manufacturing, roads and urban areas cannot realistically account for a very large share of land deforested each year. However, forest degradation (tree removal) has been shown to be driven by logging in Latin America and Asia and by charcoal production in Africa. After timber harvest, whether the forest is allowed to regenerate depends to a great extent on land governance.
- See: Kissinger et al., 2012. *Drivers of Deforestation and Forest Degradation*.
- ³⁰ FAO, 2010. *Global Forest Resources Assessment 2010*.
- ³¹ FAO, 2010. *Global Forest Resources Assessment 2010*.
- ³² See, for example, a report of the first global maps of forest change 2000–2012 from remote sensing by M. Hansen and P. Potapov. Available at: <http://googleresearch.blogspot.com/2013/11/the-first-detailed-maps-of-global.html>. Note that degradation can be from a number of significant factors besides human harvesting, including fires, droughts, etc.
- ³³ Berenguer, E., Ferreira, J., Gardner, T.A., Aragão, L.E.O.C., De Camargo, P.B., et al., 2014. A large-scale field assessment of carbon stocks in human-modified tropical forests. *Global Change Biology*, 20(12). 3713–3726. DOI:10.1111/gcb.12627.
- ³⁴ Houghton, R.A., 2013. The emissions of carbon from deforestation and degradation in the tropics: past trends and future potential. *Carbon Management*, 4(5). 539–546. DOI:10.4155/cmt.13.41.
- ³⁵ Pan, Y., Birdsey, R.A., Fang, J., Houghton, R., Kauppi, P.E., et al., 2011. A Large and Persistent Carbon Sink in the World's Forests. *Science*, 333(6045). 988–993. DOI:10.1126/science.1201609.
- ³⁶ This is net of the benefits of forest and landscape restoration. Emissions are more easily estimated from the cutting of trees than other forms of land emissions from soils, such as from deforested organic soils or agricultural soils, but the latter are important too. See: Houghton, R.A., 2013. The emissions of carbon from deforestation and degradation in the tropics. Also see: Omuto, C., Nachtergaele, F. and Vargas Rojas, R., 2013. *State of the Art Report on Global and Regional Soil Information: Where Are We? Where to Go?* Food and Agriculture Organization of the United Nations, Rome. Available at: <http://www.fao.org/3/a-i3161e.pdf>.
- ³⁷ International Sustainability Unit, The Prince's Charities, 2015. *Tropical Forests* The range of tropical forest mitigation potential from Table 6, based on estimates in:
- Grace, J., et al., 2014. Perturbations in the carbon budget of the tropics. *Global Change Biology*. DOI:10.1111/gcb.12600.

Houghton, R.A., 2013. The emissions of carbon from deforestation and degradation in the tropics: past trends and future potential. *Carbon Management*, 4(5), 539–546.

³⁸ FAO, 2010. *Global Forest Resources Assessment 2010*.

³⁹ The per hectare estimates reflect the range found in the following sources:

TEEB, 2010. *The Economics of Ecosystems and Biodiversity Ecological and Economic Foundations*.

Costanza et al., 2014. Changes in the global value of ecosystem services.

UNEP, 2014. *Building Natural Capital: How REDD+ Can Support a Green Economy*. Report of the International Resource Panel. United Nations Environment Programme, Nairobi. Available at: <http://www.unep.org/resourcepanel/Publications/BuildingNaturalCapitalHowREDD/tabid/132320/Default.aspx>.

These estimates have also been critiqued as oversimplifying in the context of spatial variability and nonlinearities in benefits. For a recent assessment of the value of forests, see, for example, Mullan, K., 2014. *The Value of Forest Ecosystem Services to Developing Economies*. CGD Climate and Forest Paper Series #6. Center for Global Development, Washington, DC. Available at: http://www.cgdev.org/sites/default/files/CGD_Climate_Forest_6_Value_Forest_Ecosystems-Mullan.pdf.

⁴⁰ FAO, 2014. *State of the World's Forests 2014*. Note that the benefits in both cases relate primarily to legitimate revenue generation, but a recent report also estimated the cost of illegal logging and other illegal extraction of forest products globally at US\$30–100 billion per year, representing not only a loss of national natural capital, but also significant lost tax revenue. This can be compared with total official development assistance for all purposes of US\$135 billion in 2013. See: OECD, 2014. Aid to developing countries rebounds in 2013 to reach an all-time high. News release, 8 April. Organisation for Economic Co-operation and Development, Paris. Available at: <http://www.oecd.org/newsroom/aid-to-developing-countries-rebounds-in-2013-to-reach-an-all-time-high.htm>.

⁴¹ FAO, 2014. *State of the World's Forests 2014*.

⁴² The World Bank, 2014. Poverty Overview. Last updated 7 April 2014. Available at: <http://www.worldbank.org/en/topic/poverty/overview>.

⁴³ The poverty figure is from: The World Bank, 2014. Poverty Overview.

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⁴⁴ Eliasch, J., 2008. *Climate Change: Financing Global Forests – the Eliasch Review*. Her Majesty's Government, London. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228833/9780108507632.pdf.

Also see: <http://blog.cifor.org/22173/rural-environmental-income-on-par-with-crop-income-study-finds>.

⁴⁵ The World Bank, World Development Indicators. See: <http://data.worldbank.org/topic/agriculture-and-rural-development> [accessed 6 August 2015]. Data are for 2014.

⁴⁶ The World Bank, 2012. *Global Monitoring Report 2012: Food Prices, Nutrition, and the Millennium Development Goals*. Washington, DC. Available at: <http://go.worldbank.org/B8CQ09GOZ0>.

⁴⁷ FAO, 2011. *The State of the World's Land and Water Resources for Food and Agriculture*.

A net 260 million ha of forest were eliminated in Africa, Asia, Central and South America combined between 1990 and 2012; a net 10 million ha of forest were added in Europe and North America combined. See: <http://faostat3.fao.org/download/G2/GF/E>.

⁴⁸ The World Bank, 2007. *World Development Report 2008: Agriculture for Development*. Washington, DC. Available at: <http://go.worldbank.org/H999NAVXGO>.

⁴⁹ See: <http://www.bonnchallenge.org>.

⁵⁰ See: <http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/New-York-Declaration-on-Forest-%E2%80%93-Action-Statement-and-Action-Plan.pdf> [accessed 6 August 2015].

Forest landscape restoration means regrowing whole forests on a large scale, but very often will involve reforesting tracts of land such as steep slopes, the tops of hills and river borders within a broader “mosaic landscape”, in addition to agroforestry.

See: Wolosin, M., 2014. *Quantifying the Benefits of the New York Declaration on Forests*. Climate Advisers. Available at: <http://www.climateadvisers.com/quantifying-the-benefits-of-the-new-york-declaration-on-forests>.

⁵¹ Minnemeyer, S., Laestadius, L., Sizer, N., Saint-Laurent, C. and Potapov, P., 2011. Atlas of Forest and Landscape Restoration Opportunities. Forest and Landscape Restoration project, World Resources Institute, Washington, DC. Available at: <http://www.wri.org/resources/maps/global-map-forest-landscape-restoration-opportunities>. They estimate that there are 2.314 billion ha of lost and degraded forest landscapes around the world (relative to land that could support forests in the absence of human interference; precise data and interpretation confirmed by map author Lars Laestadius, 14 August 2014).

The Aichi Target #15 states: “By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.” 15% of 2.314 billion ha is 347 million ha. See <http://www.cbd.int/sp/targets/> [accessed 22 July 2014].

⁵² The estimate is an “order of magnitude” doubling of the detailed estimate of US\$85 billion given for 150 million ha of forest restoration in Verdonne, M., Maginnis, S. and Seidl, A., 2014 (forthcoming). *Re-examining the Role of Landscape Restoration in REDD+*. International Union for Conservation of Nature. Thus, the estimate is conservative, as it ignores the last 50 million ha of the 350 million ha estimate. Their calculation assumes 34% of the restoration is agroforestry, 23% is planted forests, and 43% is improved secondary and naturally regenerated forests, all distributed across different biomes.

⁵³ New York Declaration on Forests, 2014. Available at: http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/New-York-Declaration-on-Forests_19May2014.pdf.

⁵⁴ The Economist, 2015. A recipe for sustainability: Palm-oil firms are trying to go green. Governments could do more to help. 1 August. Available at: <http://www.economist.com/news/business/21660141-palm-oil-firms-are-trying-go-green-governments-could-do-more-help-recipe> [accessed 10 September 2015].

⁵⁵ See: <http://www.forestlandscaperestoration.org/>.

⁵⁶ The Low Carbon Technology Partnerships initiative. See: <http://lctpi.wbcsdservers.org/>.

⁵⁷ The Netherlands played a key leadership role in the development of GACSA between 2011 and 2014. See <https://www.wageningenur.nl/en/Dossiers/file/Dossier-Climate-Smart-Agriculture.htm>.

⁵⁸ FAO, 2010. “Climate-Smart” Agriculture: Policies, Practices and Financing for Food Security, Adaptation and Mitigation. Food and Agriculture Organization of the United Nations, Rome. Available at: <http://www.fao.org/docrep/013/i1881e/i1881e00.pdf>.

⁵⁹ United Nations Climate Summit 2014, 2014. *Agriculture: The Global Alliance for Climate-Smart Agriculture: Action plan*. New York. Available at: <http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/09/AGRICULTURE-Action-Plan.pdf>. Twenty countries and 62 others, including multilateral organisations, companies and civil society organisations, were full members of GACSA as of April 2015, with a facilitation unit housed at the UN Food and Agriculture Organization (FAO). Global Alliance for Climate-Smart Agriculture, n.d. Members of the Global Alliance for Climate-Smart Agriculture. Available at: <http://www.fao.org/gacsa/members/en/> [accessed 18 May 2015].

⁶⁰ See: Ignaciuk, A., 2015. Adapting Agriculture to Climate Change: A Role for Public Policies. OECD Food, Agriculture and Fisheries Papers, No. 85. OECD Publishing, Paris. DOI: <http://dx.doi.org/10.1787/5js08hwwfnr4-en>.

⁶¹ See: <http://www.cgiar.org> and <http://www.globalresearchalliance.org>.

⁶² OECD, 2014. Climate Change, Water and Agriculture: Towards Resilient Systems, OECD Studies on Water, OECD Publishing, Paris. DOI: <http://dx.doi.org/10.1787/9789264209138-en>.

⁶³ Ouya, D., 2014. A new alliance to spread climate smart agriculture among millions of smallholder farmers in Africa. *Agroforestry World Blog*, 8 December. Available at: <http://blog.worldagroforestry.org/index.php/2014/12/08/a-new-alliance-to-spread-climate-smart-agriculture-among-millions-of-smallholder-farmers-in-africa/>.

⁶⁴ Bonn Challenge, n.d. Commitments. Available at: <http://www.bonnchallenge.org/commitments> [accessed 18 May 2015].

⁶⁵ United Nations Environment Programme (UNEP), n.d. The African Ministerial Conference on the Environment (AMCEN). Available at: <http://www.unep.org/roa/InformationMaterial/Events/15thAMCENSession/tabid/794089/Default.aspx>. [accessed 18 May 2015].

⁶⁶ See: <http://www.wri.org/our-work/project/initiative-20x20>.

⁶⁷ Almost by definition, public-sector and philanthropic institutions are also “impact investors”, but the term is used here solely to designate private-sector investors.

⁶⁸ These funds have been formally committed in principle to fund projects under the 20x20 umbrella, but have not yet been invested in specific projects. In some cases, the fund managers concerned are still actively seeking to increase support from limited partners to fund these investments (personal communication from the 20x20 Secretariat team).

⁶⁹ IUCN and WRI, 2014. *A Guide to the Restoration Opportunities Assessment Methodology (ROAM): Assessing forest landscape restoration opportunities at the national or sub-national level*. International Union for Conservation of Nature, Gland, Switzerland.

Lamb, D., 2014. *Large-Scale Forest Restoration*. Abingdon and New York, Routledge and Earthscan.

Also see: Vergara, W., Rios, A., Praeger, S., de Camino and Gallardo, L., forthcoming. *The Economic Argument for the Restoration of Degraded Lands in Latin America and the Caribbean*. 20X20 Initiative draft manuscript.

⁷⁰ The 12% figure comes from comparing 150 million ha to the 1.23 billion ha of severely degraded agricultural landscapes reported in: FAO, 2011. *The State of the World's Land and Water Resources for Food and Agriculture (SOLAW)*.

⁷¹ IUCN and WRI, 2014. *A Guide to the Restoration Opportunities Assessment Methodology (ROAM)*. Lamb, 2014. *Large-Scale Forest Restoration*.

⁷² Lamb, 2014. *Large-Scale Forest Restoration*. Reitbergen-McCracken, J., Maginnis, S. and Sarre, A., 2007. *The Forest Restoration Handbook*. London: Routledge and Earthscan.

⁷³ IUCN and WRI, 2014. *A Guide to the Restoration Opportunities Assessment Methodology (ROAM)*. Lamb, 2014. *Large-Scale Forest Restoration*.

⁷⁴ See, for example: Chapman, C.A. and Chapman, L.J., 1999. Forest Restoration in Abandoned Agricultural Land: a Case Study from East Africa. *Conservation Biology*, 13. 1301–1311. DOI:10.1046/j.1523-1739.1999.98229.x.

⁷⁵ Cooper, P.J.M., Capiello, S., Vermeulen, S.J., Campbell, B.M., Zougmore, R. and Kinyangi, J., 2013. *Large-Scale Implementation of Adaptation and Mitigation Actions in Agriculture*. CCAFS Working Paper No. 50. CGIAR Research Program on Climate Change, Agriculture and Food Security, Copenhagen. Available at: <http://hdl.handle.net/10568/33279>.

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⁷⁶ Shames, S., Kissinger, G. and Clarvis, M.H., 2014. *Global Review: Integrated Landscape Investment – Synthesis Report*. Available at: http://peoplefoodandnature.org/wp-content/uploads/2014/09/FinancingStrategiesforIntegratedLandscapeInvestment_Shames_etal_2014.pdf.

⁷⁷ See, for example: Milder, J.C., Hart, A.K., Dobie, P., Minai, J. and Zaleski, C., 2014. Integrated landscape initiatives for African agriculture, development, and conservation: a region-wide assessment. *World Development*, 54. 68–80. Available at: <http://www.sciencedirect.com/science/article/pii/S0305750X13001757>.

⁷⁸ FAO, 2010. *“Climate-Smart” Agriculture*.

⁷⁹ In a small sample of World Bank landscape restoration project completion reports examined, the ratio of land with active modifications to total project land varied from 6% to 25%, with the proportion driven by the needs of the situation and the scale of the project. The total project cost per treated ha varied from US\$1,500 to US\$12,500 depending on the extent of degradation addressed and infrastructure creation involved.

⁸⁰ The World Bank, 2014. *Rwanda Agricultural Policy Note. Promoting Agricultural Growth in Rwanda: Recent Performance, Challenges and Opportunities*. Washington, DC.

⁸¹ The World Bank, 2009. *Project Appraisal Document*. Report No. 50901-RW. Washington, DC.

⁸² The World Bank, 2014. *Implementation Status & Results Report*. Report No. ISR15719. Washington, DC. Available at: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/AFR/2015/04/14/090224b082dbb797/2_0/Rendered/PDF/Rwanda000Land00Report000Sequence009.pdf.

See also: <http://www.worldbank.org/projects/P114931/land-husbandry-water-harvesting-hillside-irrigation?lang=en&tab=overview>.

⁸³ The World Bank, 2014. *Implementation Status & Results Report*.

⁸⁴ The World Bank, 2014. *Implementation Status & Results Report*. These numbers imply that the restored area farmed by women was 0.12 ha per capita, which needs to be put in the context of an average absolute farm size of 0.4 ha.

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- ⁸⁶ Rwanda Ministry of Agriculture and Animal Resources. *Land Husbandry, Water Harvesting and Hillside Irrigation Project*. Available at: <http://www.lwh-rssp.minagri.gov.rw/lwh/>. A project Economic Rate of Return (ERR) is not estimated as the project is still ongoing. However the median ERR of recently closed agricultural projects at the World Bank was 24 %. See: The World Bank, 2013. *World Bank Group Agricultural Action Plan 2013–2015*. Washington, D.C. Available at: <http://documents.worldbank.org/curated/en/2013/01/17747135/implementing-agriculture-development-world-bank-group-agriculture-action-plan-2013-2015>.
- ⁸⁷ Boudreaux, K., 2011. Economic Liberalization in Rwanda's Coffee Sector: A Better Brew for Success. Chapter 11 in: *Yes, Africa Can: Success Stories from a Dynamic Continent*. Chuhan-Pole, P. and Angwafo, M. (eds.) World Bank Book Series. Available at: <http://siteresources.worldbank.org/AFRICAEXT/Resources/258643-1271798012256/Rwanda-coffee-11.pdf>.
- ⁸⁸ The World Bank, 2008. *Implementation Completion and Results Report*. Report No: ICR0000875. November. Available at: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2008/11/25/000333037_20081125224142/Rendered/INDEX/ICR00008750ICR1isclosedONov02502008.txt. The sample is relatively small and there was considerable variation across sites, but the data are an improvement on anything available before.
- ⁸⁹ The project started in 2002 and was active in the field by 2003. It can be anticipated that the annual rate of new sequestration will decline over time.
- ⁹⁰ The World Bank, 2008. *Implementation Completion and Results Report*.
- ⁹¹ See: <http://www.fedegan.org.co/programas/ganaderia-colombiana-sostenible>.
- ⁹² Condensed from: Buckingham, K. and Hanson, C., forthcoming. Case example: Costa Rica. In: *Case Studies in Forest Restoration*. Food, Forests, and Water Discussion Brief. World Resources Institute. Washington, DC. To be available at: <http://www.wri.org>.
- ⁹³ Parker, C., Cranford, M., Oakes, N. and Leggett, M. (eds.), 2012. *The Little Biodiversity Finance Book*. Global Canopy Programme. Oxford. Available at: http://www.globalcanopy.org/sites/default/files/LittleBiodiversityFinanceBook_3rd%20edition.pdf. This citation gives estimates of "biodiversity finance", but this is taken as a good indicator of both conservation and landscape restoration finance.
- ⁹⁴ Falconer, A., Parker, C., Kennlyside, P., Dontenville, A. and Wilkinson, J., 2015. *Three Tools to Unlock Finance for Land-Use Mitigation and Adaptation*. Climate Policy Initiative and Climate Focus. July. Available at: <http://climatepolicyinitiative.org/publication/three-tools-to-unlock-finance-for-land-use-mitigation-and-adaptation/>.
- ⁹⁵ Credit Suisse, World Wildlife Fund and McKinsey & Co., 2014. *Conservation Finance: Moving beyond donor funding toward an investor-driven approach*. Available at: <https://www.credit-suisse.com/media/cc/docs/responsibility/conservation-finance-en.pdf>.
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- ⁹⁷ The Global Impact Investing Network (GIIN) is a non-profit organisation dedicated to increasing the effectiveness of impact investing; its website contains useful definitions and a large amount of relevant information. See: <http://www.thegiin.org/cgi-bin/iowa/aboutus/index.html>. A sense of the culture and dynamic of impact investing is also found at: Clark, C., Emerson, J. and Thornley, B., 2012. *The Impact Investor: People & Practices Delivering Exceptional Financial & Social Returns*. Special Report. Insight at Pacific Community Ventures, Duke Case Center for the Advancement of Social Entrepreneurship, and Impact Assets. San Francisco. Available at: http://www.pacificcommunityventures.org/uploads/reports-and-publications/The_Six_Dynamics_of_Impact_Investing_October_2012_PCV_CASE_at_Duke_ImpactAssets.pdf.
- ⁹⁸ NatureVest and EKO Asset Management Partners, 2014. *Investing in Conservation: A landscape assessment of an emerging market*. NatureVest. Available at: <http://www.naturevestinc.org/Reports/info.html>.
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- ¹⁰¹ IMPACTBase, a database of Impact Investors under the Global Impact Investing Network. IMPACTBase, 2015. *IMPACTBASE Snapshot: An analysis of 300+ impact investing funds*. Global Impact Investor Network. Available at: <http://www.thegiin.org/assets/documents/pub/ImpactBaseSnapshot.pdf>.

¹⁰² At its simplest, an IRR measures with one number the percentage returns to capital at a given time of an income stream when all inputs and outputs are valued at market prices (more technically, the discount rate that is needed to make the net present value of an income stream equal to zero). From a finance standpoint, an IRR that exceeds the “opportunity cost of capital” (or what it costs in the relevant marketplace to borrow to invest) is profitable. Public impact investors such as the World Bank currently tend to prefer “Economic Rates of Return” (ERR), which are similar to IRRs, except that all inputs and outputs are valued at their undistorted (and often somewhat theoretical) real economic values that include allowances for non-market costs and benefits (i.e. impacts).

¹⁰³ NatureVest and EKO Asset Management Partners, 2014. *Investing in Conservation*.

¹⁰⁴ Clark et al., 2012. *The Impact Investor*.

¹⁰⁵ NatureVest and EKO Asset Management Partners, 2014. *Investing in Conservation*. Also see a similar finding in: Credit Suisse, World Wildlife Fund and McKinsey & Co., 2014. *Conservation Finance*.

¹⁰⁶ De Groot, R., Blignaut, J., Van der Ploeg, S., Aronson, J., Elmqvist, T. and Farley, J., 2013. Benefits of Investing in Ecosystem Restoration. *Conservation Biology*, 27(6). 1286–1293. DOI:10.1111/cobi.12158.

¹⁰⁷ NatureVest and EKO Asset Management Partners, 2014. *Investing in Conservation*.

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¹¹⁰ Shames et al., 2014. *Global Review: Integrated Landscape Investment – Synthesis Report*.

International Sustainability Unit, The Prince’s Charities, 2015. *Tropical Forests*.

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¹¹² The World Bank, 2013. *World Development Report 2014, Risk and Opportunity: Managing Risk for Development*. Washington, D.C. Available at: <http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTWDRS/EXTNWDR2013/0,,contentMDK:23459971~pagePK:8261309~piPK:8258028~theSitePK:8258025,00.html>.

¹¹³ Clark et al., 2012. *The Impact Investor*.

¹¹⁴ GIIN, 2013. *Catalytic First-Loss Capital*. Issue Brief. Global Impact Investing Network. Available at: <http://www.thegiin.org/cgi-bin/iowa/resources/research/552.html>.

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¹¹⁷ “Moral hazard” in the financial sense could induce entrepreneurs benefitting from the risk guarantee to engage in riskier approaches than they would otherwise. “Distortions” could arise from the presence of the risk guarantee inducing investment to move from a higher return sector to a lower return sector that benefits from the risk guarantee.

¹¹⁸ GIIN, 2013. *Catalytic First-Loss Capital*.

¹¹⁹ Following the logic that funding depends on limited partners who are pursuing impact and wish to have regular results reporting on that impact; this will be easier to manage collectively on a regional and sectoral basis.

¹²⁰ NatureVest and EKO Asset Management Partners, 2014. *Investing in Conservation*.

¹²¹ The Global Impact Investing Network (GIIN) is a non-profit organisation dedicated to increasing the effectiveness of impact investing, currently sponsored by Rockefeller Philanthropy Advisers. Details at: <http://www.thegiin.org/cgi-bin/iowa/home/index.html>.

¹²² This model, which is based on leasing, buying or otherwise alienating land from its current users, comes from developed countries such as the United States and Australia where land markets function, the rule of law is strong, and both labour and the capital tied up in land have multiple alternative opportunities available locally. The approach has also been used in areas with low population density at the start, such as forests and grasslands. See as examples: <http://www.lymetimber.com/> and <http://slmpartners.com/activities/slm-australia-livestock-fund>.

¹²³ Similar to the discussion on pathways out of poverty for rural people in developing countries in The World Bank, 2007. *Agriculture for Development*. World Development Report 2008. Washington, D.C. Available at: http://siteresources.worldbank.org/INTWDR2008/Resources/WDR_00_book.pdf.

¹²⁴ Stevens, C., Winterbottom, R., Reyntar, K. and Springer, J., 2014. *Securing Rights, Combating Climate Change: How Strengthening Community Forest Rights Mitigates Climate Change*. World Resources Institute Report, July. Available at: <http://www.wri.org/securingrights>.

¹²⁵ There is always a balance between rapid assistance from multilateral and bilateral public funding agencies and ensuring that safeguards are adequately met in a changing world. Accordingly, safeguards need period review and updating, as is currently taking place for the World Bank's system. Getting the balance right is difficult. Some stakeholders have expressed concern that currently proposed updates will unduly weaken existing World Bank safeguards in the forest area. See: <http://www.bankinformationcenter.org/our-work/safeguards/>.

¹²⁶ See: <http://www.fao.org/docrep/016/i2801e/i2801e.pdf>.

¹²⁷ See: <http://www.fao.org/cfs/cfs-home/resaginv/en/>.

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¹³⁰ Documentation of a prominent civil society view on GAFSP from One is at <http://www.one.org/us/2011/11/11/how-better-aid-achieves-results-in-agriculture/> and from ActionAid is at <http://www.modernizeaid.net/2011/03/18/the-global-agricultural-and-food-security-program-gafsp-an-innovative-fund-to-fight-hunger/>. An open letter of support for GAFSP signed by 28 prominent civil society organisations to President Obama is at: http://hunger.cwsglobal.org/site/DocServer/NGO_Letter_to_President_Obama_on_GAFSP_Transfer_FINAL.pdf?docID=4421.

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¹³² See: complete documentation of all GAFSP procedures and evaluations at: <http://www.GAFSPFund.org>, which also contains all the annual reports and formal evaluations.

¹³³ Toubmourou, T., 2015. *Indonesia's Forests Disappearing at Record Rates*. The Asia Foundation Blog. Available at: <http://asiafoundation.org/in-asia/2015/02/25/indonesias-forests-disappearing-at-record-rates/>.

¹³⁴ Seymour, F., La Vina, T. and Hite, K., 2014. *Evidence linking community-level tenure and forest condition: An annotated bibliography*. Climate and Land Use Alliance, San Francisco, CA. Available at: http://www.climateandlandusealliance.org/uploads/PDFs/Community_level_tenure_and_forest_condition_bibliography.pdf.

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ABOUT THE NEW CLIMATE ECONOMY

The Global Commission on the Economy and Climate, and its flagship project The New Climate Economy, were set up to help governments, businesses and society make better-informed decisions on how to achieve economic prosperity and development while also addressing climate change.

In September 2014, the Commission published *Better Growth, Better Climate: The New Climate Economy Report*. Since then, the project has released a series of country reports on the United States, China, India and Ethiopia, and sector reports on cities, land use, energy and finance. In July 2015, the Commission published *Seizing the Global Opportunity: Partnerships for Better Growth and a Better Climate*. It has disseminated its messages by engaging with heads of governments, finance ministers, business leaders and other key economic decision-makers in over 30 countries around the world.

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