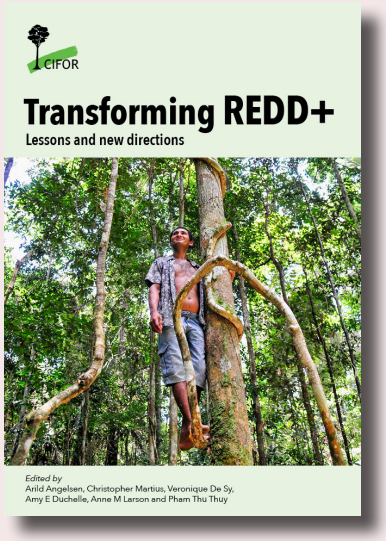
Chapter 15

Forest restoration

Getting serious about the 'plus' in REDD+

Louis Verchot, Veronique De Sy, Erika Romijn, Martin Herold and Ruben Coppus



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Forest restoration

Getting serious about the 'plus' in REDD+

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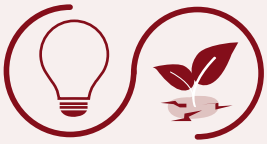
Key messages

- Initiatives that aim to restore degraded forests and landscapes share many goals with REDD+. However, few restoration projects track forest carbon impacts, since pledges are mainly based on area to be restored, and many projects do not include the establishment of reference levels or carbon monitoring in their activities.
- Many restoration projects in Latin America focus on increasing vegetation cover and re-establishing ecological processes and biodiversity. However they do not directly address the causes of degradation, which are remarkably similar across the tropics.
- The restoration goals selected by the studied projects in Latin America and the Caribbean tended to reflect the aims of the donors, rather than the specific causes of degradation. Multilateral donors contribute the largest amounts of funding to large-scale restoration initiatives and have strong social agendas.

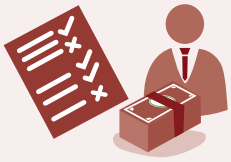
Forest landscape restoration in Latin America

Forest landscape restoration is a way to halt degradation across the tropics. This chapter looks at initiatives in Latin America that aim to restore degraded forests and other ecosystems.

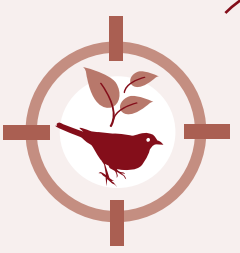
Drivers of forest landscape degradation are similar across the tropics; they vary predictably with the level of deforestation of a country.



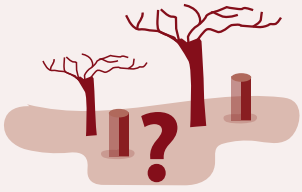
The challenge for national and international restoration programmes is to change incentive structures to promote sustainable land stewardship and restoration of degraded lands.



Objectives vary according to the type of donor funding the project. The largest investments are made by multilateral donors with social and economic goals; impact investors focus on commercially oriented projects, whereas government agencies tend to support smaller projects.



Most projects focus on increasing vegetation cover, recovery of biodiversity, or re-establishing and improving ecological processes.



These priorities aim to enhance ecosystem quality and functioning in degraded landscapes, rather than address the drivers of degradation directly.

It is uncommon for restoration activities to track forest carbon impacts, as pledges are mainly area-based and many projects do not include carbon monitoring in their activities.

15.1 Restoration takes the stage

About 75% of forest lands are degraded, and the rate of forest degradation – 185 million ha between 2000 and 2012 – exceeds that of deforestation (FAO 2015). Land degradation is defined as a long-term loss of productivity and ecosystem function caused by human activity, from which land cannot recover on its own for several decades (Bai *et al.* 2008; Gibbs and Salmon 2015). It is a serious economic problem that is only growing as demand for food, feed, fuel, water and other ecosystem services increases. The Economics of Land Degradation Initiative (Nkonya *et al.* 2016) estimated very high economic losses from soil degradation; these vary across regions but can be as high as 10% of GDP in sub-Saharan countries. With a global population expected to grow by 2.2 billion people by 2050 (UNDESA 2017), and as dietary preferences change, the pressure on land resources will only increase.

Countries are stepping up to meet the challenge. In 2007, the Bali Action Plan put the 'plus' activities into REDD+ by calling for actions to support conservation, the sustainable management of forests, and the enhancement of forest carbon stocks in developing countries, in addition to the two 'Ds' of deforestation and degradation. Several reviews of subnational REDD+ activities show that restoration features prominently in pilot projects (de Sassi *et al.* 2014; Panfil and Harvey 2016). The 2014 New York Declaration on Forests[1] – endorsed by 189 governments, companies, indigenous peoples and civil society organisations (CSOs) – aims to restore 150 million ha of degraded landscapes and forestlands by 2020, and 200 million ha more by 2030. Signatories to the Global Development Framework pledged to include ambitious, quantitative forest conservation and restoration targets for 2030 and, with the adoption of the Sustainable Development Goals (SDGs), all countries agreed to reduce deforestation, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss (SDG 15). Halting degradation and restoring degraded lands appeared as a priority activity in the Addis Ababa Action Agenda of the Third International Conference on Financing for Development (2015), before featuring prominently in Article 5 of the Paris Agreement. Finally, the Bonn Challenge (launched in 2011 by the German government and IUCN, and later endorsed at the UN Climate Summit in 2014) aims to bring 150 million ha of deforested and degraded land into restoration by 2020, and 350 million ha by 2030. Its implementation is supported by regional collaboration platforms across the tropics, including Initiative 20x20 in Latin America and the Caribbean, AFR100 in Africa, and regional ministerial roundtables in many countries across the tropics.

1 https://nydfglobalplatform.org/

Yet despite such widespread support, making the transition from unsustainable exploitation of forest resources to forest stewardship is challenging. This is primarily due to entrenched interests and institutional resistance to change, which impact on policy related to reducing deforestation and land degradation (Brockhaus *et al.* 2017). What we do know is that countries with limited forest resources that have initiated policy change are typically more successful at establishing national programmes for reducing deforestation than those that still have large areas of forest cover (Korhonen-Kurki *et al.* 2014, 2018). The availability of performance-based funding and strong national ownership of the REDD+ process are also important elements for success.

As a leading partner in Initiative 20x20 in Latin America and the Caribbean, the International Center for Tropical Agriculture (CIAT) and partners have been analysing restoration activities in the region for the past three years. In this chapter, we look at the causes of forest degradation across the tropics and examine several initiatives aimed at restoring degraded forests and other ecosystems, to begin to answer two questions: How are programmes addressing causes of forest degradation and prioritising restoration activities? What progress are they making? Our main focus is on restoration efforts in Latin America and the Caribbean, but examples from Africa and Asia are also included (Boxes 15.1 and 15.2).

15.2 From forest degradation to forest restoration

Rates of forest loss are mostly well quantified, and the causes of deforestation are well documented (Chapter 5). Since the above commitments were made, there has been some progress in reducing deforestation (Houghton and Nassikas 2017). However, forest degradation is more difficult to define and quantify, and estimates of emissions from forest degradation are uncertain. This is particularly troublesome, because most countries that are integrating REDD+ objectives into national actions to mitigate climate change are prioritising activities associated with reducing degradation, restoring forests and enhancing carbon sinks (Salvini *et al.* 2014).

Across the tropics, there are typically four major categories of direct drivers or activities leading to forest degradation: (i) timber harvesting; (ii) biomass harvesting for energy (fuelwood and charcoal production); (iii) grazing livestock within forests; and (iv) fire (Hosonuma *et al.* 2012). In a pan-tropical analysis, Hosonuma *et al.* (2012) showed that timber harvesting was the most important driver in Latin America and Asia, followed by biomass harvesting for energy (Figure 15.1, A). Fire and livestock grazing accounted for small percentages of total forest degradation in these regions. In Africa, biomass harvesting for energy was the largest driver, followed by timber harvesting; livestock grazing accounted for a small percentage but was still twice as important in Africa as it was in Latin America or Asia. Fire was a small driver of forest degradation in Africa.

Box 15.1 Forest landscape restoration in Ethiopia

Habtemariam Kassa

Ethiopia has committed to restoring 22 million ha of degraded forests and agricultural lands by 2030. By conserving natural forests and establishing new ones, forests are expected to play significant role in the socioeconomic development of the country, to account for 50% of the national emissions reduction potential, and to contribute to building a carbon-neutral economy by 2030 (CRGE 2011). Between 2016 and 2020, Ethiopia aims to put 2 million ha of natural forests under participatory forest management (PFM) while identifying and demarcating 4.5 million ha of degraded land for restoration, afforestation and reforestation. In addition to the state-led Sustainable Land Management Programme, which implements soil and water conservation work on degraded communal lands in a large number of districts, PFM and area exclosures are the two major state-led forest landscape restoration mechanisms. The Environment, Forest and Climate Change Commission has identified eight major types of tree-based restoration options for improving tree cover in different landscapes, such as lakesides and riverbanks, buffer zones of natural forests, rangelands and agricultural landscapes (MEFCC 2018).

Although the country has made a large national restoration commitment, political will at state and lower levels of government is still lacking to integrate this into local-level plans. The national FLR pledge represents a bold initiative that could bring about climate and economic benefits, yet the state-led FLR initiatives face a number of challenges:

- Population pressure is driving the demand for more farmland.
- There is no national land-use policy or land-use plan to define forest lands and to govern land-use changes.
- There is no clear national FLR strategy to guide the planning and implementation of FLR initiatives.
- Costs of FLR initiatives are largely borne by rural communities.
- Efforts are limited to the middle-elevation and highland areas of the country, while deforestation and land degradation are also severe in the lowlands where rapid land-use changes are occurring.
- Socioeconomic factors that undermine effectiveness and sustainability of FLR initiatives are not adequately addressed, e.g., tenure rights of rehabilitated lands are poorly defined, conservation goals dominate in setting objectives of rehabilitating degraded lands and as a result little emphasis is given to enhancing land productivity and income to land managers that would have sustained their continued engagement in FLR.
- Engagement of land managers in negotiating the often contradictory objectives of restoration (economic and conservation) and the means to achieving objectives is suboptimal.
- Certain soil and water conservation practices are employed almost everywhere as there is little attention to location and ecozone specificity of sites and practically no emphasis on the cost–benefit analysis of alternative restoration options.
- Communities commonly fail to sustain their engagement, as equitable benefit-sharing mechanisms are hardly discussed and agreed upon.
- There is a lack of capacity even at the national level to identify and use existing technology and decision-support tools to establish rigorous FLR planning and monitoring systems to systematically support the processes and assess outcomes of FLR interventions in different contexts and at different levels (Kassa 2018; Kassa *et al.* 2017)

Box 15.2 Potential, challenges and possible solutions for peatland restoration in Indonesia

Herry Purnomo

Indonesia has one of the world's largest areas of tropical peatland after Brazil and the Congo Basin, at around 15 million ha of peatland, mainly on the islands of Sumatra, Borneo and Papua. Peatlands are under increasing pressure from population and economic growth, and despite a government regulation stipulating that peatlands over 3 m deep should be protected, they are being rapidly converted to agricultural land, and are used by large-scale wood pulp and oil palm plantation corporations. This drainage of peatlands makes them prone to fire, and in the last three years 2.6 million ha of land – including 33% of all peatlands (LAPAN 2015) – has been burned; this led to an estimated 1.2 billion tCO_2e emissions (Huijnen *et al.* 2016) and record fires in 2015 that exposed 43 million people to toxic haze and led to economic losses of USD 16.1 billion (Glauber and Gunawan 2016).

Initiatives supporting peatland restoration have been undertaken at different levels, and by diverse stakeholders. The Peatland Restoration Agency (BRG), established in 2016, provides a major opportunity to reduce fires on peatlands, and aims to restore 2.5 million ha of peatland over five years (2016–2021). Government Regulation (PP) No. 57/2016 for peatland management and conservation has been issued, along with regulations to operationalise it. These policies have seen some successes in the past (Jong 2017) and are supported by environmental NGOs and CSOs. The BRG, ministries of agriculture and of environment and forests, together with oil palm and pulp and paper companies have developed peatland and fire prevention programmes targeting communities and farmer groups. However, not all stakeholders are in favour of these plans. Some local communities contest the loss of productive land and livelihoods; companies that hold permits for land currently allocated for peatland restoration expect to be compensated for their investments; and even some government institutions have expressed their disagreement.

A better understanding of the underlying political economy is needed in order to identify institutional arrangements that are both efficient and equitable for stakeholders. Central government bodies, like the BRG and MOEF, will be unable to implement the restoration agenda if the interests of local government, private sectors and local communities are not considered. At the community level, understanding how income can be generated from peatland restoration efforts is crucial, and various options should be explored before action is taken to ensure that livelihoods are protected.

15.2.1 Viewing restoration through the lens of forest transition theory

Using the forest transition curve model, which depicts a typical change in forest cover over time in a given geographical area (Mather 1992; Rudel *et al.* 2005), Hosonuma *et al.* (2012) divided the phases of landscape transition into four categories: pre-transition, early-transition with high levels of forest cover and accelerating deforestation, late-transition with large areas of forest lost and declining rates of deforestation, and post-transition, in which natural forest loss approaches zero and secondary forest recovery or tree planting contributes to an overall increase in forest cover (see Figure 15.1, B). Degradation from timber harvesting was important in all phases of the transition curve, but decreased in the late-transition phase. During

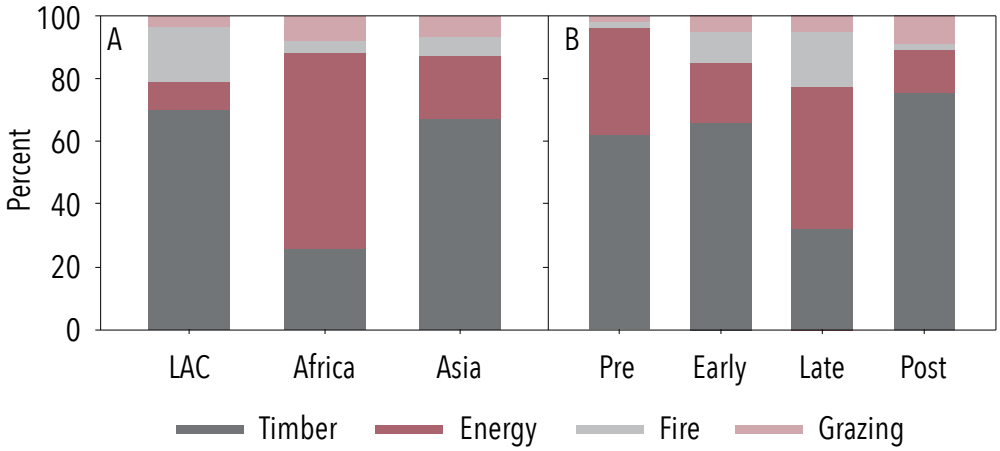


Figure 15.1 Estimates of the relative proportions of degradation resulting from four proximate drivers, by continent (A) and by phase of forest transition (B), for the period 2000–2010

Source: Hosonuma *et al.* (2012)

this phase, biomass harvesting for energy, along with uncontrolled fires, were more important agents of degradation than in earlier phases. Many African countries are in this late phase of the transition curve, as the remaining forest areas are being cut for fuelwood. In the post-transition phase, economic development reduces fuelwood collection and charcoal production, as other energy sources become available. Timber extraction is usually better managed in this phase.

The forest transition theory describes a general pattern that has been observed in many places across the globe, but policies affect how the transition spells out; likewise, the optimal policy mix changes along the forest transition curve (Angelsen and Rudel 2013). For example, the introduction of biogas, produced from agricultural waste, manure and other organic matter, is gaining popularity in many tropical countries as a means to reduce pressure on wood resources where biomass harvesting is degrading forests. It has been shown to reduce degradation and enhance forest regeneration (Agarwala *et al.* 2017). In China, widespread farming on sloping lands led to forest loss, severe soil erosion and large-scale flooding, causing loss of lives. In response, the government introduced forest conservation and rural development policies that led to widespread conversion of cropland to forests (Gutiérrez Rodríguez *et al.* 2016).

15.2.2 Restoration activities in Latin America and the Caribbean

In our ongoing research (Box 15.3) we are characterising restoration efforts across the region. Restoration projects are well distributed across the continent, with the highest concentrations in areas around the Amazon basin, and in Colombia,

Box 15.3 CIAT's research project on land restoration in Latin America

We compiled a database of 154 restoration projects throughout the region (Figure 16.2) from freely available public information and previously assembled databases and project descriptions provided by the World Resources Institute (WRI), CIFOR (Murcia and Guariguata 2014; Méndez-Toribio *et al.* 2018), Bioversity International, the World Agroforestry Centre (ICRAF) and Peru's National Forest Service (SERFOR) (Cerrón *et al.* 2017). The database includes projects that have been developed through Initiative 20x20, and others belonging to initiatives from the Global Environment Facility (GEF), Clean Development Mechanism (CDM), Forest Investment Program (FIP) or local initiatives led by NGOs and national governments. While not exhaustive, the database includes all restoration initiatives for which data were readily available. We provide summaries of the data in this chapter.

We also pursued the semi-quantitative objective of generating a typology of activities, to see how projects cluster. A subset of 97 recent and ongoing restoration projects were used to define a typology of restoration activities, and we used multivariate exploratory and clustering techniques to group the projects according to common characteristics.

The database, with these projects, has been published through the LUCID portal (http://lucid.wur.nl/datasets/forest-and-landscape-restoration).

Ecuador, Mexico and Peru. These are also areas with high potential for vegetation growth, as clearcutting or logging activities have taken place in these tropical biomes. Restoration projects also occur in non-humid tropical areas, particularly in the shrublands, grasslands, steppes and mountainous areas of Argentina, Chile, Bolivia and Peru.

Restoration projects differ in scale, with smaller activities (<1,000 ha) typically focusing on the establishment of plantations, and larger activities (>100,000 ha) focusing on natural regeneration. Figure 15.2 maps the 154 projects, and Figure 15.3 summarises their most important goals. Most projects have multiple goals, the most common of which is to increase vegetation cover (for 117 projects). Increased vegetative cover is also linked to biodiversity recovery (a goal of 105 projects) and the recovery of ecological processes (a goal of 100 projects).
Many projects (84) also aim to provide local employment and to enhance the livelihoods of local communities. In particular, all Forest Investment Program (FIP) and Clean Development Mechanism (CDM) projects, and most Global Environment Facility (GEF) projects, try to create local employment. In total, 74 projects have climate change mitigation (carbon sequestration) as a goal; this includes all FIP and CDM projects and most GEF projects. Fewer projects from Initiative 20x20 (41%) have this goal, and projects labelled as 'other' typically do not have this focus (6%). Promoting agroforestry productivity is a goal in 60 projects, and 46 projects include the goal of promoting silvopastoral productivity; these two goals occur most often in GEF and FIP projects (more than 50% of all GEF and FIP projects have one or both).

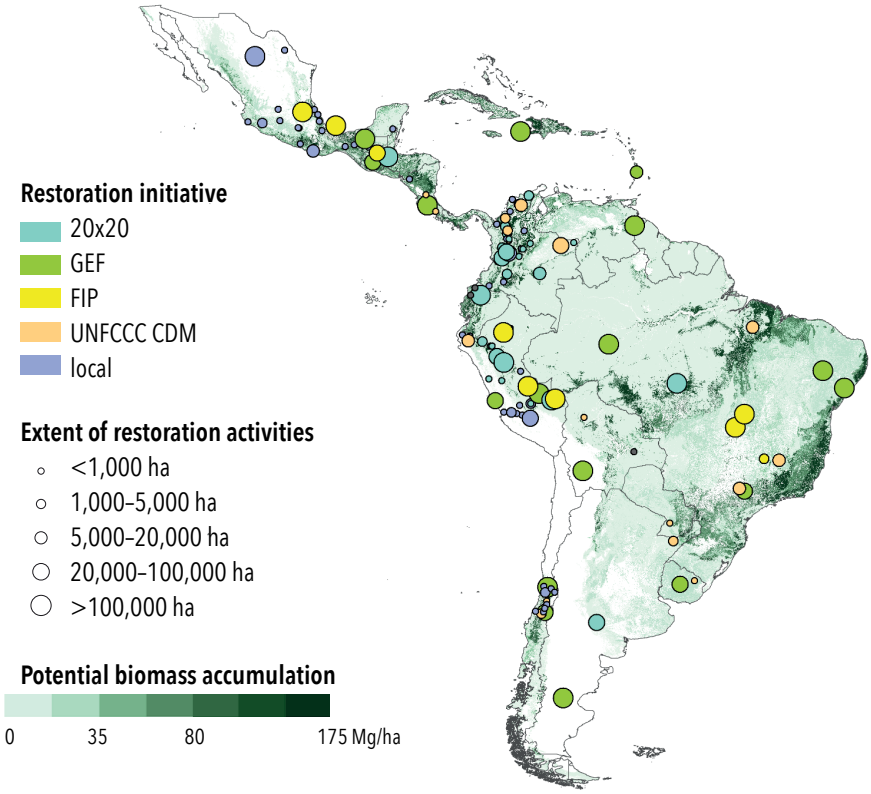


Figure 15.2 Map of 154 restoration projects in Latin America and the Caribbean

Note: 20x20 = Initiative 20x20; GEF = Global Environment Facility; FIP = Forest Investment Program; CDM = Clean Development Mechanism. Dots represent the centre location of the administrative boundaries of the restoration projects. The colour of the dots indicates the type of initiative (source of funding) and the size indicates the extent of the restoration activities in the project. The project centres are overlaid onto a map showing the potential forest aboveground biomass accumulation, indicating the carbon sequestration potential when areas are restored to forests. The database for the map can be found online: http://lucid.wur.nl/datasets/forest-and-landscape-restoration.

Source: Based on data from WRI (Potapov *et al.* 2011), FAO global ecological zones (FAO 2010) and GEOCARBON global forest biomass (Santoro *et al.* 2015; Avitabile *et al.* 2016).

Restoration projects are implementing a variety of activities to reach these objectives. Apart from restoring vegetation, many projects implement activities to control erosion, stabilise land, restore soil or recover riverbeds. Projects that aim to increase vegetation cover often use natural regeneration or assisted regeneration to enhance vegetation growth, e.g., many of the GEF and FIP projects. A major strategy in CDM projects, and some others, is to make use of mixed species or monoculture plantations, to increase vegetation cover and sequester carbon. These types of projects usually also benefit the local community, by providing employment opportunities. Other common project activities include exclusion of grazing (fencing), control of fires and fertilisation.

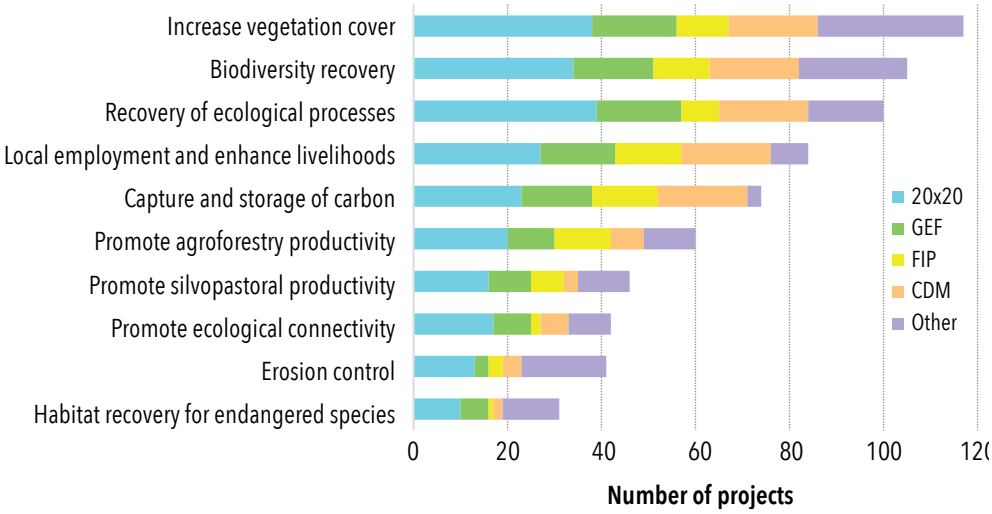


Figure 15.3 Overview of project goals of the 154 restoration projects, displayed for the initiatives

Note: 20x20 = Initiative 20x20; FIP = Forest Investment Program; GEF = Global Environment Facility; CDM = Clean Development Mechanism. One restoration project can have multiple goals. The bars indicate the number of projects per restoration initiative that have a particular goal in their restoration strategy.

Payment for ecosystem services (PES) schemes were not frequently incorporated into the restoration projects surveyed. Only 14 of 154 projects showed evidence of this activity. This is probably due to uncertainties about their long-term sustainability and the limited effectiveness of PES in promoting forest restoration (Pirard *et al.* 2014). Also, PES schemes tend to be more efficient when a single, clearly defined ecosystem service is targeted (Wunder 2013); this is often not the case, given the multifunctional character of most projects. The economic incentives of projects with funding from impact investors focused on timber and non-timber products, as well as carbon sequestration. All CDM-funded projects in developing countries entail emissions reduction activities that can earn certified emissions reduction credits, which can be traded, sold and used by industrialised countries. PES schemes were, to a certain degree, associated with funding from international donors (30%) but were almost absent in the other types of projects.

Our typology classification (Box 15.3) resulted in the creation of three groups, based on the environmental, socioeconomic, organisational, financial and technical dimensions that characterise the approaches to restoration of degraded lands:

1. **Restoration projects funded with public money from international donors such as GEF and FIP, with occasional support from national governments and/or private investors.** This group is characterised by restoration of large areas, as well as large budgets, sound planning that addresses the degree and causes of degradation, and the establishment of baselines and a monitoring plan.

The projects address global socioeconomic and environmental themes that are in line with the SDGs.

2. **Restoration projects funded with private money from impact investors and companies.** This group is distinguished by incomplete planning, where the degree of degradation is often not determined and a baseline study and a monitoring plan are frequently omitted. The emphasis is on timber production; global themes such as improving rural livelihoods and biodiversity are addressed to a lesser extent.
3. **Restoration projects funded with public money from (sub)national governments and occasionally national and international donors.** This group is characterised by small-scale local projects with low costs. In general, this group is not linked with the international agenda except for improving biodiversity.

Many projects financed with private money are a direct result of Initiative 20x20, but the relationship between local restoration projects and the initiative is less clear. Various countries have made ambitious pledges to the Bonn Challenge, and Initiative 20x20 is working with them to implement these (e.g., Colombia 1 million ha, Brazil 12 million ha, Peru 3.2 million ha)[2]. Although these projects appear to be disconnected from national restoration agendas, they will likely be used to meet national pledges to Initiative 20x20.

15.3 Restoration projects need to invest more in monitoring and reporting

There is increasing international pressure to ramp up monitoring and reporting on the results of actions, particularly following adoption of the SDGs, and with the growing number of Bonn Challenge pledges. It is easy for groups and countries to pledge to restore land, but how can we know what has really been restored by 2020? How do we know if there is real change on the ground? How do we know what is being restored, or what the benefits of restoration actions have been?

Answering these questions is important for the international community, but it represents a cost to projects. A proper monitoring programme can, however, improve the effectiveness of restoration projects, and increase cost efficiency by allowing for adaptive management of projects. Monitoring can inform restoration project design and site selection and ensure progress towards implementation milestones and restoration goals. It can also improve efficacy of the restoration process itself, by feeding information back to project managers about successes and failures, thereby improving future restoration decision-making.

Restoration activities undertaken in Latin America and the Caribbean have many different goals, including increasing agricultural productivity, protecting watershed

2 http://www.bonnchallenge.org/commitments

and improving water quality, supporting local incomes, and reducing soil erosion. As such, many systems exist for reporting on restoration efforts, including country-led and global efforts. Depending on the project's goals, different factors and processes need to be monitored: environmental variables (e.g., changes in forest/vegetation cover, biodiversity, soil, water and climate); production systems (e.g., data on yield and livestock in agroforestry and silvopastoral systems); and socioeconomic variables (e.g., food security, household income and gender equality). Measuring progress requires multiple data sources and methods, including collection of ground data, field visits, community monitoring, spatial maps and GIS data, remote sensing data, participatory workshops, household surveys and questionnaires, and statistical data. In questionnaire responses on project-level monitoring and reporting, all types of data were regarded as very important or somewhat important by the projects; however, approaches that require lower technical capacity and provide lower statistical rigour were more widely used in the implementation of current projects.

Monitoring and impact assessment requires financial and human resources. Many academic and practitioner guidelines insist on the need for rigorous monitoring of projects, to enhance efficiency and effectiveness of implementation and improve reporting (e.g., Murcia *et al.* 2016). Yet experience on the ground shows that projects do not routinely invest resources in these activities, and managers often resist diverting resources from restoration activities that achieve their primary objectives. It is typically only in hindsight that underinvestment in project monitoring is lamented, when projects cannot demonstrate impact (Lindenmayer *et al.* 2012). Thus, it is perhaps not surprising that responses to our survey singled out financial resources as the major constraint to project monitoring (Table 15.1). Obtaining data and other technological issues were considered much less important.

Table 15.1 Obstacles encountered during monitoring of project progress

Answer option	Percentage of projects
Insufficient financial resources	80%
Difficulty in obtaining other types of data (ground measurements, household surveys)	40%
Insufficient technological resources (computer facilities, software, mobile devices)	30%
Difficulty in obtaining GIS data and maps (due to low internet speed, cloud cover, low data availability or other issues)	30%
Lack of skilled human resources	30%
Difficulty in motivating land owners and communities	30%
Lack of coordination	25%

Note: Survey questions were answered by 20 project representatives.

A middle ground between the desires of academics and those of project managers needs to be found. Improving restoration monitoring requires lowering the costs, or providing positive incentives to projects that invest resources in these activities. PES schemes, being dependent on performance, can represent a potential incentive; however, they require a payment culture and well-defined land or resource tenure regimes (Wunder 2013). Aggregation of monitoring and reporting in ways that spread costs and gain scale efficiencies may improve the willingness of smaller projects to allocate resources to monitoring efforts. A search of environmental reporting literature revealed a scarcity of experimentation with alternative reporting schemes that could inform the international restoration agenda. This is an area that is ripe for innovation.

15.4 Conclusion

The drivers of forest degradation are remarkably similar across the tropics, and they vary predictably with the level of deforestation of a country. While this might suggest that generic approaches to restoration could be scalable, the challenge for national and international restoration programmes is to change incentive structures so that they promote sustainable land stewardship and restoration of degraded lands. Analyses so far indicate that successful restoration is more likely when certain key elements are present, like local ownership of restoration programmes, the availability of financial resources, and continuous advances in the rules that govern resource use.

From the 154 projects surveyed in Latin America and the Caribbean, findings show that the restoration goals selected by projects tended to reflect the aims of the donors, rather than the specific drivers of degradation. The largest investments are being made by multilateral donors, while impact investors and governmental agencies support smaller projects and have more targeted, often commercially oriented goals. Smaller projects focused on employment creation (within the project), while larger ones focused on creating long-term economic opportunities as part of their sustainability plans. Most projects focused on increasing vegetation cover, recovering biodiversity, or re-establishing and improving ecological processes. While these priorities have the laudable goal of enhancing ecosystem quality and functioning in degraded landscapes, they fail to address the drivers of degradation directly. Unless projects begin to address these underlying drivers, the sustainability of restoration actions cannot be assured.

The goals of restoration initiatives overlap with those of REDD+, since most of the primary activities of these initiatives also lead to enhancements in vegetation carbon stocks. Unlike REDD+, however, it is uncommon for restoration activities to track forest carbon impacts, as restoration pledges are mainly area-based rather than based on tonnes of carbon. Restoration project monitoring approaches build on multiple data streams; however, approaches used in the projects studied are primarily low-tech and community-oriented. Typical expectations are that 5–10% of project resources should be devoted to monitoring, but this is likely to be a

significant burden on smaller projects. If countries are to report on restoration activities and achievements, practical approaches to national measurement and reporting must be developed which integrate project results and lessons learned.

The Bonn Challenge has stimulated a lot of political interest in landscape restoration, and this has translated into significant pledges in Latin America and the Caribbean. Older initiatives by large multilateral donors have generated some significant lessons, but actions by impact investors and subnational governments are being implemented on much smaller scales and with different objectives. As might be expected, impact investors focus on commercial activities that are likely to give financial returns, while large-scale multilateral and bilateral donors support projects with stronger social agendas. Balancing public goods and services with private benefits will be an important challenge as governments seek to leverage private resources to scale up restoration efforts. Lessons from PES experiences may be relevant, but many large restoration projects have multiple objectives and lack clearly defined ecosystem services. Clarifying and quantifying the environmental benefits, and determining who is benefiting, will improve the prospects of PES approaches for restoration initiatives. Finally, the success of ongoing and past restoration efforts has been poorly documented, which makes learning lessons and assessing impact difficult.

Restoration efforts in Latin America are predominantly undertaken through projects. Yet land degradation is a widespread problem affecting all ecosystems in the region. Projects are gaining experience in practical solutions that work in specific contexts, and it is unlikely that they can be scaled up for significant impact at national or regional levels. The way forward requires stepping up the scale and the sophistication of approaches through less reliance on projects and more focus on systematic approaches backed by policy reform and appropriate incentives and disincentives.

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