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INVESTIGATING THE CHALLENGES AND OPPORTUNITIES FOR SCALING UP ECOSYSTEM RESTORATION

Background Report

Annelies Sewell, Jetske Bouma and Stefan van der Esch

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Investigating the challenges and opportunities for scaling up Ecosystem Restoration

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Corresponding author
Annelies Sewell, annelies.sewell@pbl.nl

Authors
Annelies Sewell, Jetske Bouma, Stefan van der Esch

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EXECUTIVE SUMMARY

This background report investigates two key challenges in scaling up investments in ecosystem restoration (ESR) — financing and coordination — and provides recommendations on how they might be addressed. Scaling up ESR investments features a significant increase in inputs, labour and the capacity for restoration and rehabilitation of ecosystems and their services, meaning ESR projects become larger and more numerous.

ESR can reduce both ecosystem degradation and smallholder[1] vulnerability, providing local benefits in terms of food security and enhanced smallholder resilience. At the same time, ESR generates regional benefits, such as improved water management, and global benefits, including biodiversity conservation and climate change mitigation — altogether making ESR a promising approach for reaching the Sustainable Development Goals. While the number of restoration projects is on the rise, significant scaling up of restoration activities does not seem to be taking place. We argue that this is partly due to financing issues, but that lack of coordination also plays a role, in terms of the absence of mechanisms to aid coordination between actors and levels. Whereas the financing issues are being widely debated and innovative approaches are being explored, attention for the difficulties associated with coordination is missing. As ecosystem restoration requires creating affinity between the local and global levels and aligning public and private interests, it is crucial that financing and coordination are jointly addressed. This is particularly important with regard to building trust and ensuring long-term commitment between stakeholders.

Based on our analysis of the literature and interviews with key stakeholders, we conclude that there is a lack of coordination between financing and supply and demand in the field of ESR projects. Also, start-up and maintenance costs are perceived as high with few tangible benefits, yet for the majority of ecosystems, ESR provides net economic benefits. Context specificity and lack of standardised costs add to huge cost variations among projects, which heightens the risk of investment. This means there is a need to share best practices, build knowledge sharing networks, allocate funds for incubation phase projects with uncertain costs, and maybe even develop restoration insurance schemes. Returns for ESR projects vary in form (public - private, monetary - non-monetary), location of delivery (local - global) and time frame (short - long term), which adds to the risk of investment, uncertainty about collateral for larger investors and concerns with regard to non-monetary returns. This highlights the need for public co-funding of ESR, to cover the social returns of restoration projects, ensure long-term commitment and thereby leverage private funds. The high risk and uncertainty of ESR investments is also partly caused by the lack of an investment track record, long project timescales, project size, uncertainty in costs and presence of public non-monetary returns. Risks can be grouped into various categories including novelty, externality, longevity, capacity and technical and regulatory risk. They may be tackled by learning from experiences in other sectors such as infrastructure, agriculture, water and renewable energy, and by creating Public Private Partnerships (PPPs) and introducing risk

[1] See Glossary

reducing guarantees. To reduce the search and information costs of effective prioritisation and targeting of ESR projects, it is important to broker existing knowledge through regional and local networks and involve regional actors in investment targeting and decision making. Overall, costs do not necessarily have to be high, but organisation and representation expenses related to coordination of stakeholder interests and financing can be substantial given the lack of institutional frameworks, particularly when linking global goals to local implementation and decision making. Investment funds, PPPs and community-based approaches can help to reduce costs. Finally, monitoring and enforcement of restoration projects is crucial for building investor confidence and reducing risk and uncertainty, particularly regarding agreement on the way responsibilities are allocated and costs are shared. This requires standardisation of evaluation methods and indicators, and adequate implementation and enforcement of methods at the local level across short to long-term project timescales.

Overall, scaling up investments in ESR requires attention for coordination at the local and regional levels. We have observed a trend towards investments by the private sector through gateway sectors such as agriculture and forestry. Private sector investments can deliver the additional and much-needed financing for ESR, though further scaling up requires a strong enabling environment to reduce investment risks and ensure social returns on investment, particularly those which are not profitable for private investors. This includes political support to address perverse incentives that drive land degradation and increase the opportunity costs of restoration, policies for mechanisms that capture the monetary value of restoration (PES, REDD+) or help to reduce risk (guarantees), and the availability of public financing to leverage private financing and support incubation stage projects where the costs and risks are high.

Reducing the investment risk for private stakeholders requires institutions and organisations that can show experience and consistent performance in developing a strong investment track record in ESR. Knowledge brokering and technical capacity remain of primary importance, particularly at the regional level, in order to share best practices and bring stakeholders to agreement. This can be achieved by policy support to strengthen existing global networks such as the Global Partnership on Forest and Landscape Restoration and the development of regional and local PPP platforms and coordination organisations, which can help improve access to appropriate and sustainable financing. In addition, there is no need to re-invent the wheel, as lessons learned from other sectors such as agriculture and infrastructure can serve as blueprints for ESR, regarding novelty, longevity and regulatory finance risks (see section 2.1.3).

Finally, cost recovery is crucial for sustainable ESR projects. Innovative mechanisms, prioritisation and effective use of financing through mapping, monitoring and enforcement must ensure that long-term investments lead to the delivery of private and public services. This requires standardisation of assessments of ESR potential and improved, consistent and enforced monitoring and mapping.

Outline

1 Introduction

An estimated 12 million hectares of land are being degraded each year at a rate of 23 hectares a minute. Degraded ecosystems impact provisioning of ecosystem services and the benefits they provide for human welfare. Though prevention is generally 'cheaper than the cure', ecosystem restoration (ESR) can promote economic growth and social cohesion. In addressing the challenges of biodiversity loss, reduced ecosystem resilience and degraded production systems, ESR has the potential to combine the global policy agendas of biodiversity protection, climate change and food security.

2 Key Issues

Worldwide, there are opportunities to restore more than 2 billion hectares of degraded and deforested land. But turning opportunity into action is made difficult by the need to create affinity between public and private actors and connect the global and local levels. These complications affect the coordination of supply and demand of bankable projects and an adequate and sustainable supply of financing, which are broken down into two groups of issues;

a Financing

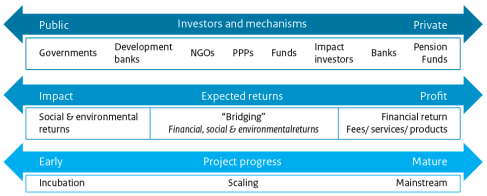
Start-up & maintenance costs
Investment returns & cost recovery
Risks & uncertainty

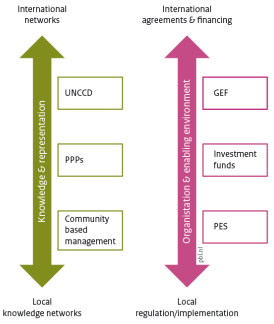
b Coordination

Search & information costs
Organisation & representation
Monitoring & enforcement

c Finance and Coordination Mechanisms

Various methods exist that can help connect the global and local levels and create affinity between actors, in order to address financing and coordination issues.





3 Illustrations

Successful ESR implementation requires coordination of supply and demand of suitable projects and financing. Varying project conditions, project initiators and funding mechanisms influence the extent to which this can be achieved. Addressing coordination issues and tensions may help to reduce financial issues of risk, cost, and return. Five in depth cases are used to illustrate strengths and weaknesses in approaches – China's Loess Plateau, Ethiopia's Tigray Region, Colombia's watershed restoration, Brazil's Atlantic Forest, and Kenya's Lake Naivasha.

Strengths include a strong enabling environment, presence of private finance support, diverse financial instruments for cost recovery including market based mechanisms, and presence of coordination mechanisms such as PPPs and investment funds. **Weaknesses** include a lack of financial coordination at the regional level, lack of adequate representation and organisational capacity at the local level, high level of risk for investors due to a lack of investment track record, and a lack of monitoring and enforcement at the local level including implementation of standards and safeguards.

4 Ways Forward

In order to scale up investments in ESR to contribute towards international policy goals, approaches should;

- **Develop a strong enabling environment**: regulation to reduce opportunity costs, clarity in contracting, safeguards for public good delivery and local representation, allow for the implementation of various mechanisms that combine public and private returns as well as methods to recover costs.
- **Create a strong track record**: to reduce risk priorities need to be coordinated and projects and financing need to be through institutions and organisations that can show experience and consistent performance
- **Avoid reinventing the wheel** - learn about the handling of finance and coordination issues in other sectors with a similar blend of public and private benefits such as water, energy or transport infrastructure sectors.
- **Build knowledge brokering organisations and networks**: to efficiently bring stakeholders and investors to agreement, specialised organisations are needed to bridge scales with technical expertise, best practices and project development experience in efficiently bringing stakeholders and investors to agreement.
- **Advance standards for exploration of ESR project potential**

1 Introduction

An estimated 12 million hectares of land are being degraded globally each year at a rate of 23 hectares a minute (UNCCD, 2015). Currently, 1.9 billion of the Earth's total 13 billion hectares are considered degraded, primarily in central Asia, South America and Sub-Saharan Africa, in humid and dryland areas, in cropland, grassland, pasture and forested ecosystems (Gibbs & Salmon, 2015) (Nkonya, Mirzabaev, & von Braun, 2016). At the same time, both the Millennium Ecosystem Assessment (MA, 2005) and The Economics of Ecosystems and Biodiversity (TEEB, 2010) demonstrate that ecosystems provide a multitude of benefits to human society and wellbeing. Once ecosystems are degraded, the provisioning of ecosystem services is affected, constituting a welfare loss. Land degradation, in combination with population growth, competing demands for land, poverty and lack of good governance are likely to increase the risk of conflict and migration, such as can be seen currently in Africa and the Levant (van Schaick & Dinnissen, 2014). The international community and national governments have been attempting to halt ecosystem degradation by launching international programmes and stimulating sustainable land management practices through recent efforts such as Sustainable Development Goal 15 (Box 1).

Box 1 **International policy ambitions and pledges**

Aichi Target 5 (2010)
The Aichi Targets were agreed on by the parties of the Convention of Biological Diversity. Target 5 states that by 2020, the rate of loss of all natural habitats, including forest, should be at least halved and where feasible brought close to zero, while degradation and fragmentation should be significantly reduced. Under this convention, 15 percent of all degraded ecosystems are due to be restored by 2020.

Bonn Challenge (2011)
This initiative aims to restore 150 million hectares of degraded land and forests by 2020, with current commitments standing at 86 million hectares by various countries including the USA, Brazil, Rwanda, Pakistan, Colombia, Ethiopia, El Salvador, Guatemala, Democratic Republic of Congo, Burundi, Honduras, India, Mexico and Costa Rica. Other organisations such as Initiative 20x20 and AFR 100 operate at the regional level and since COP21, private companies such as Asia Pulp & Paper have joined the effort.

New York Declaration on Forests (2014)
More than 130 governments, companies, civil society organisations and indigenous peoples endorsed the New York Declaration on Forests, which pledges to cut the loss of forests in half by 2020 and to end forest loss by 2030. It also calls for the restoration of more than 350 million hectares of forests and croplands, an area larger than India, which would bring significant climate benefits and take pressure off primary forests.

Sustainable Development Goals (2015)
Sustainable Development Goal 15, Life on land, aims to sustainably manage forests, combat desertification, halt and reverse land degradation, and stem biodiversity loss (UN, 2015). The Land Degradation Neutrality (LDN) target is an associated initiative which aims to restore 2 billion hectares of degraded land by 2030. LDN is also a specific goal of the United Nations Convention to Combat Desertification (FAO & Global Mechanism of the UNCCD, 2015).

UNFCCC, REDD+
The Reducing Emissions from Deforestation and forest Degradation (REDD+) framework was initiated by the United Nations Framework Convention on Climate Change and updated to its current form in 2010. REDD+ goals include reducing emissions from deforestation and forest degradation, sustainable management of forests and conservation and enhancement of carbon stocks. REDD+ is a framework through which developing countries are rewarded financially for emissions reductions resulting from a decrease in forest conversion to alternate land uses (The REDD Desk, 2016).

Next to interventions that focus on reducing or avoiding degradation, recent initiatives such as the Economics of Land Degradation (ELD Initiative, 2015) suggest that opportunities also exist in rehabilitation, i.e. bringing degraded lands back into production, and restoration, returning them to a more natural state (Box 2). Though prevention is generally cheaper than the cure[2], restoration and rehabilitation of land can, under the right circumstances, promote economic growth and social cohesion (Caspari, Alexander, ten Brink, & Laestedius, 2014), and aid in addressing the challenges of biodiversity loss, reduced ecosystem resilience and degraded production systems. Restoration therefore has the potential to combine the global policy agendas of biodiversity protection, climate change, food and water security.

Box 2 **Definitions**

Land degradation
Land degradation is defined by the United Nations Convention to Combat Desertification as:

"Reduction or loss of the biological or economic productivity and complexity of rain fed cropland, range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns".

Restoration
Where land degradation results from the loss of or trade-offs between functions, restoration aims to restore the balance. There are various definitions for restoration, which include:

- **(Ecological) restoration** - "re-establishing the presumed structure, productivity and species diversity at a site or ecosystem that has been degraded, damaged or destroyed" (Society for Ecological Restoration (SER), 2004) (FAO, 2005).
- **Rehabilitation** – re-establishing and improving the productivity of degraded land, primarily for activities such as agriculture (FAO, 2015).
- **Reclamation** - recovering the productivity of degraded land, often with exotic species, to create a new ecosystem with little of the original biodiversity (WWF/IUCN, 2000)
- **Mosaic restoration** – a fragmented landscape of differing land uses and restoration types, which come together to form a multifunctional landscape patchwork, including agroforestry and silvopasture (McCracken, Maginnis, & Sarre, 2008).
- **Wide-scale restoration** – the mass restoration of one ecosystem or biome. A good example is the restoration of areas with a low population density and which were formerly dominated by forests (WRI, 2014)
- **Landscape restoration** – this involves a combination of the above approaches across an interconnected landscape, defined by geophysical boundaries (WWF International, 2007).
- **Integrated Landscape Management (ILM)** - a new concept which is becoming well-known is Integrated Landscape Management (ILM), a response to growing competition for natural resources and demands from various sectors, that provides an opportunity to address trade-offs and develop synergies. It is important to highlight that the ILM approach covers a range of sustainable land management techniques including restoration, rehabilitation and reclamation, which are the focus of this study. But ILM goes beyond landscape restoration, and can help to pool interests and funds across landscapes.

Ecosystem restoration (ESR) is a combination of the above approaches applied to a specific ecosystem. In areas where degradation still occurs, it can also include prevention to some degree. We ESR as *active restoration*, in contrast to more *passive conservation*, though of course they can be used in combination. Restoration can complement conservation, given that only 13% of the world's land is protected and often not under effective management (CBD & UNEP, 2011).

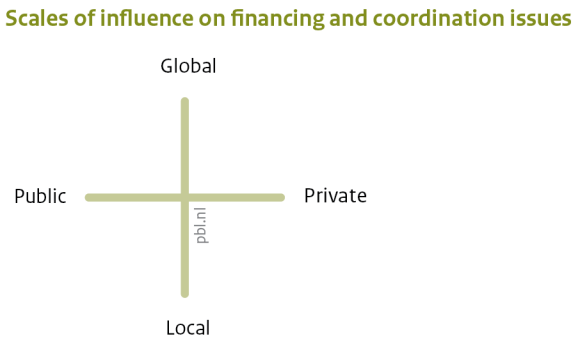
[2] The cost of conservation is variable but is typically 0.01-1,000 USD/ha/year, whereas restoration varies from a few hundred dollars in general to 554,000 USD/ha specifically for coral reefs (Nelleman & Corcoran, 2010) (TEEB, 2010). However, restoration estimates can rival those of conservation (see section 2.1.1.).

However, restoring degraded ecosystems is not cheap, and although studies by TEEB (2010) and the ELD Initiative (2015) indicate that societal benefits greatly outweigh the costs, the required investments are often large with returns spread over long time periods. Hence, although investments in ESR are desirable from a socio-economic perspective, the financial returns are often limited, making for a weak business case for the private sector. This explains the large number of efforts initiated by public and non-state actors to stimulate ESR (Wentink, 2015) (Box 3).

Box 3 **Recent initiatives**

Name	**Restoration type**	**Financed by (Public/Private)**	**Initiated by**	**Active Project Sites**
Initiative for Sustainable Landscapes (ISLA)	Landscape restoration and rehabilitation	Public and Private	PPP	Kenya, Ethiopia, Brazil, Cote d'Ivoire, Vietnam, Indonesia, Liberia
Althelia Ecosphere	Mosaic restoration	Private and Public	International non-profit	Kenya, Peru, Guatemala, Brazil
Moringa Fund	Mosaic, Landscape restoration	Private and Public	Private investment bank and public sector forestry commission	Colombia, Peru, Chile, Brazil, Cameroon, Gabon, Dem. Congo
Livelihoods Fund For Family Farming	Mosaic, Landscape restoration	Private	Private sector food companies (Danone and Mars, Inc.)	Côte d'Ivoire, Kenya, Madagascar, India, Indonesia, Brazil (in development)
Commonland	Mosaic, Landscape restoration and rehabilitation	Public and Private	International non-profit, university and private foundation	Spain, South Africa, Western Australia, The Netherlands (in development)
Living Lands	Landscape restoration	Public and Private	Regional non-profit	South Africa
Initiative 20x20	Restoration, rehabilitation, landscape restoration	Public and Private	International research organisation, international non-profit and national governments	Mexico, Guatemala, Matto Grosso (Brazil), Nicaragua, Honduras, Argentina, São Paulo (Brazil), Espírito Santo (Brazil): El Salvador, Costa Rica, Colombia, Ecuador, Peru and Chile, Bosques Modelo, American Bird Conservancy, Conservación Patagónica (in development)
African Forest Landscape Restoration Initiative AFR 100	Restoration, rehabilitation, landscape restoration	Public and Private	International research organisation, international non-profit and national governments	Central African Republic, Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mozambique, Niger, Rwanda, Togo, Uganda (in development)

This paper reviews the emerging evidence that shows how these initiatives can be made more effective, focussing on financing and coordination issues as the two main constraints for progress. Addressing them is difficult because it requires both establishing affinity between local and global levels, and aligning public and private interests (Figure 1).



Source: PBL.

Figure 1: Scaling up financing for ESR requires sufficient coordination between global and local levels, and public and private interests. The multiple stakeholder and multiple scale nature of ESR projects is a consequence of the multi-dimensional nature of ecosystems and ecosystem services

In the first place, the importance of ESR is discussed at the global level revealing a clear need for national governments to participate through initiatives such as the Bonn Challenge (Box 1). However, initiatives coordinating national action according to global goals are few and far between, and where they do exist, the translation to implementation at the local level is often insufficient. In addition, financing is generally made available at the national and international levels, but there are difficulties in determining the best locations for investment and effectively coordinating activities on the ground. While large-scale forest restoration projects, such as those in China and South Korea, show that this is possible, the complexity of ecosystem and landscape-based approaches requires effective coordination at the local and regional levels. On the whole, things are made difficult by a lack of project information and evaluations, and failure to share best practices.

Secondly, while public financing is made available, it is insufficient relative to the international targets (Box 1), especially considering the scale of restoration and rehabilitation potential – which requires investments in the order of billions of dollars[3]. However, restoration and rehabilitation tend to generate both public and private benefits, suggesting that there is scope for private financing. Logical private players for such investments include impact and institutional investors (Wentink, 2015) (van der Horn & Meijer, 2015). Purely private financing of ESR would cause difficulties given the public-good nature of many ESR benefits, and the partly non-monetary, non-profitable and long-term returns on investment.

[3] For example, all REDD+ activities could lead to halving deforestation rates by 2030, at a cost of USD 17.2 – 33 billion/year (Nelleman & Corcoran, 2010). The cost of the Bonn Challenge is estimated at 36 billion USD/year, and the LDN target (SDG 15.3) at 318 billion USD/year (FAO & Global Mechanism of the UNCCD, 2015).

Hence, scaling up ESR requires public-private cooperation in financing and coordination across private, public, local and global level scales.

While there are many small-scale restoration efforts and initiatives (Bossio, et al., 2015) (see Appendix), generic lessons on the general challenges ESR is faced with, financing in particular, are only beginning to be understood and shared (Hanson, Buckingham, Dewitt, & Laestadius, 2015) (Shames & Scherr, 2015).

Approach

This paper provides insights into the way actors and initiatives have been addressing the financing and coordination issues relating to ESR. The aim of this study is to gather information on the opportunities and constraints for scaling up ecosystem restoration. We have conducted interviews with key players to test and verify the importance of financing and coordination issues. In addition, we have collected peer-reviewed and grey literature and attended a number of workshops and conferences to ascertain the relevance of our focus and approach. The research includes a small number of case studies of initiatives in various countries (China, Kenya, Colombia, Ethiopia and Brazil) to illustrate the importance of financing and coordination issues. These have been specifically selected to fit the analytical framework we use. Based on the studied literature, this framework applies the specific notion that ecosystem restoration ultimately comes down to the restoration of ecosystem service provisioning, which implies attention for scales of delivery (local-global) and service types (private-public).

2 Key issues and mechanisms

Estimates on potential restoration and rehabilitation areas are sparse and generally focus on global data without providing sufficient detail on regional levels. For example, Popatov et al., (2011) highlight that worldwide there are opportunities for restoring more than 2 billion hectares of deforested and degraded lands in both tropical and temperate regions — an area larger than South America. Though useful, Popatov's study provides only a rough estimate of the restoration potential, generated with preliminary satellite data which lacks both an in-depth biophysical focus and attention for socio-economic factors. In addition, Popatov's restoration estimates focus on forest landscape management, and do not take into account potential restoration sites in ecosystems such as grasslands, drylands, savannahs and wetlands. More detailed assessments are needed to show the potential for providing specific benefits beyond carbon sequestration. Hence there is a need for higher resolution mapping that considers biophysical and socio-economic indicators, for example through the Restoration Opportunities Assessment Methodology (IUCN and WRI, 2014).

Opportunity does not always equal implementation: while national governments are increasingly committed to global targets such as the Bonn Challenge (Box 1), efforts to turn these pledges into concrete restoration projects on the ground are constrained by the need to achieve affinity between public and private actors and bridge local and global levels. This discrepancy, combined with the lack of detail on possible restoration sites (and thus on the benefits they may produce), affects the coordination of supply and demand of projects[4] and an adequate assessment of their potential which eventually leads to the emergence of a limited number of 'bankable projects', those that are attractive for public and private investors[5].

International and national sources of public financing are unlikely to be sufficient, given the long-term nature of restoration activities (5-20 years) compared to grant funding lifecycles (0-5 years), the high costs associated with restoration (see Box 4 and Section 2.1.1.) and competing interests from other sectors at the national and local levels[6]. Financing for restoration at global and national levels is primarily available from public sources, such as the 500 million USD allocated by the Global Environment Facility land degradation funding

[4] Sizeable, low- or medium-risk investment opportunities with reasonable rates of return.
[5] By this we mean both the project demand for adequate and sustainable supply of financing, as well as the demand from the financial world for bankable project supply.
[6] For example, Sub-Saharan Africa's (SSA) public spending on agriculture, forestry, wildlife and fisheries is just 4% of total government budgets in the region, even though these are the sectors that contribute 25% of their GDP (FAOSTAT, 2012)

stream and the World Bank's 300 million USD contribution to China's Loess Plateau Watershed Restoration Project. Despite conservation financing[7] increasingly emerging as a private sector investment opportunity, particularly for private actors with long-term perspectives such as impact and institutional investors (Credit Suisse & McKinsey Center for Business and Environment, 2016), this potential is yet to become concrete in the form of large-scale investments (Wentink, 2015).

> *"When you look at the magnitude of the landscape degradation problematics across the globe, you don't need 10-100 million, you need billions, and ultimately you need to attract institutional investors and really make clear to them and demonstrate to them that this is investment in the real economy and in real assets"*
>
> - *Hans Schut, Commonland*

From this vantage point, we highlight financing (including estimating and operationalising potential benefits) and coordination (including that between different geographic levels and between public and private actors) as highly significant fields where improvements can greatly assist the scaling up of ecosystem restoration.

2.1 Financing issues

ESR projects face three primary financing issues:

- **Start-up and maintenance costs:** ESR projects are perceived as high-cost compared to conservation initiatives and other investments. Context specificity, lack of standardised costs and limited sharing of best practices all add to huge variability in costs, resulting in an increased risk of investment.

- **Investment returns and cost recovery:** Investment returns can be public, non-monetary and socio-economic, and therefore cost recovery may be an issue for the private sector restoration business case, limiting the availability of financing. Returns also vary in form (public - private, rival - excludable), location of delivery (local - global) and time frame (long - short term), creating difficulties for cost recovery.

- **Risks and uncertainty**: ESR projects are perceived as higher risk than other investment opportunities due to the lack of a strong investment track record[8], long project time scales, and uncertainty about start-up costs and returns.

[7] According to (WWF, Credit Suisse & McKinsey & Company, 2014), conservation finance is "understood to be a mechanism through which a financial investment into an ecosystem is made – directly or indirectly through an intermediary – that aims to conserve the values of the ecosystem for the long term"

[8] Track record: demonstrated experience in developing successful projects

2.1.1. Start-up and maintenance costs

ESR projects require initial investment (including start-up costs to purchase or lease an area, and acquire material, technology and expertise) and in many cases additional maintenance funding throughout the course of the project. Estimates for these costs vary greatly between ecosystems and locations, and the accuracy of and variation in calculations is influenced by the specific details of each context, including the level of ecosystem degradation, local infrastructure availability, type and scale of restoration, population pressure and density, the legal framework, existing land use and tenure arrangements, land value, labour costs and method of measurement[9] (de Groot et al., 2013), (Form International, 2015), (Bullock et al., 2011). In addition, the types of expenses included in restoration cost estimates often vary. Search and information costs and opportunity costs are often excluded or difficult to include in project budgets, despite opportunity costs accounting for the largest share of expenses for action against land degradation (Nkonya, et al., 2016). All the variables named here represent difficulties in comparing and transferring cost estimates (Boxes 4 and 5).

Box 4 **Cost estimates for global restoration ambitions**

The cost of achieving various international policy ambitions and pledges can be estimated using average restoration costs (2,390 USD/ha).

Initiative	**Estimated yearly budget (billion USD)**	**Estimated total budget (billion USD)**
Bonn Challenge (150 million ha by 2020)	36	359
New York Declaration of Forests (350 million ha by 2030)	49	837
Land Degradation Neutrality (2 billion ha by 2030)	318	4780

Source: (FAO & Global Mechanism of the UNCCD, 2015)

Box 5 **Comparability of restoration costs**

Brazil
Restoration costs (including 2 years of monitoring) in the Atlantic forest in Brazil range from 5,000 USD/ha in the south to almost twice as much in the north (Reuben, 2015).

Thailand and Mexico
Mangrove restoration in Thailand was estimated at 8,240 USD/ha for initial costs followed by annual maintenance costs of 118 USD/ha (Sathirathai & Barbier, 2001), while restoration costs for mangroves in the Gulf of Mexico were almost twice as high (Agraz-Hernández & et al., 2007).

For example, TEEB (2010) has published estimates of restoration costs ranging from 260 USD/ha for grasslands to 542,500 USD/ha for coral reefs. De Groot et al. (2013) show that costs for tropical forest restoration can be lower than 10 USD/ha, and as high as 9,000 USD/ha. It also matters whether the majority of these costs are made upfront (at start-up) or are spread over time (maintenance). While actual costs may be much lower than

[9] For example, some sources report estimated site costs for the total length of the project, and others per rotation cycle of reforestation.

expected, considerable variations and uncertainty about costs in the short to long term contribute to risk and uncertainty in ESR projects (Section 2.1.3). Efforts to standardise restoration costs are in development[10] or very recent. Nkonya et al., (2016) estimated restoration costs geographically (Figure 2), highlighting that the cost of action against degradation can be high in developed countries — given the high value of land, labour costs, and the areal size of the country — and also in regions such as Sub-Saharan Africa, due to the extent and severity of ecosystem degradation (Nkonya, et al., 2016).

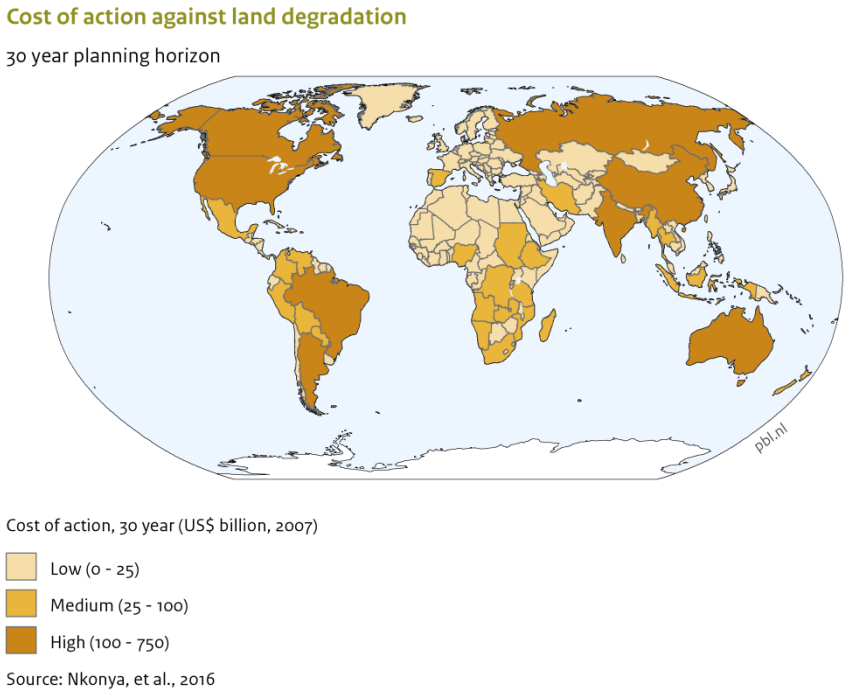


Figure 2: Cost of action against land degradation per country, given value of land and labour costs. Restoration, natural regeneration, sustainable land management and opportunity costs are included (Nkonya, et al., 2016).

It is more important to consider the total net costs of ESR, as they are not necessarily high. Holl & Howarth (2011) highlight that the majority of restoration projects provide net benefits and that it is often cheaper to invest in restoration than to build man-made replacements for ecosystem services (Box 6), while de Groot et al., (2013) have demonstrated that, even in worst case scenarios[11], investing in restoration breaks even or provides financial profit in relation to total economic value in six of the nine ecosystem types. At present, the best ecosystems for restoration investments appear to be grasslands and woodlands, in terms of their benefit-cost ratio and internal rate of return. However, in net present value terms[12], coastal and inland wetlands and tropical forest appear to be more interesting for restoration

[10] For example, the JRC Technical Report by the EU – Costs of restoration measures in the EU based on an assessment of LIFE Projects (2015).
[11] The worst case scenario defined as a discount rate of 8%, 100% of the maximum cost, and a restoration benefit of 30% of the Total Economic Value (de Groot, et al., 2013)
[12] The internal rate of return (IRR) is the rate of return needed for a project to break even, taking the cost of capital (interest, desired return) into account. The net present value (NPV) is the current value adjusted by taking into account future values and is thus an absolute figure. When comparing projects, one may have a higher IRR while the other has a higher NPV. Also, varying discount rates can determine which project is more attractive.

investments, given their higher total economic values (de Groot et al., 2013). Assumptions, including the discount rate, can influence these outcomes. The usefulness of these estimates is limited by the varied and inconsistent reporting methods of restoration projects, difficulties in valuing public and non-monetary ecosystem services, the potential for double-counting ecosystem services, and the complexity of including opportunity costs. Still, the estimates consider grasslands to be the ecosystems most affected by degradation (Bao, Nkonya, & Mirzabaev, 2016), while much of current investments is dedicated to reforestation. In general, the cost of taking action against land degradation is much lower than the cost of inaction and, on average, every US dollar invested in restoration of degraded lands has the potential to return five dollars (Nkonya, Mirzabaev, & von Braun, 2016).

Box 6 **Cost effectiveness of ESR**

Vietnam
The Vietnam National Chapter of the Red Cross has worked in northern Vietnam with local communities since 1994, protecting and restoring over 12,000 hectares of mangroves at a cost of 1.1 million USD, while generating savings on annual dyke maintenance of 7.3 million USD. The benefits enjoyed by 7,750 families include income generation, reduced storm hazards, increased food security and improved nutrition from restored fish populations (Powell & Osbeck, 2010).

As a result, conservation and restoration of natural capital may be economically beneficial, particularly in less developed countries (Balmford et al., 2003), (De Groot et al., 2013). However, while there is consensus that private sector involvement in ESR is desirable (Wentink, 2015), the economic value that is generated in restoration projects does not necessarily translate into sufficient financial return (Section 2.1.2 and 2.1.3) (Credit Suisse & McKinsey Center for Business and Environment, 2016).

Many restoration projects are privately run and carried out by consultants, or carried out on a small scale, resulting in a lack of understanding about the real costs and benefits. (Holl and Howarth, 2011). It also results in higher search and information costs (2.3.1), as well as contributing to risk and uncertainty of investments (2.1.3). Holl & Howarth (2000) and Credit Suisse & McKinsey (2016) highlight the need to develop mechanisms that deal with areas of uncertainty, for example a restoration insurance for unexpected conditions such as floods. There is also a need to standardise costs where possible, perhaps regionally, and build the sharing of best practices into project design, such as in WRI's *Scaling Up Regreening: Six steps to success* (Reij & Winterbottom, 2015).

2.1.2. Investment returns and cost recovery

High returns do not guarantee substantial cost recovery, as returns may be public and/or non-monetary, and hence difficult to capture. Returns from ESR vary in time frame (short - long term), form (public - private), and location where they are generated (local - global). These variations can influence the recovery of investments in ESR initiatives, and therefore

also the financing model required. For example, private investors may be put off by the lack of private, monetary returns on investment in the short term.

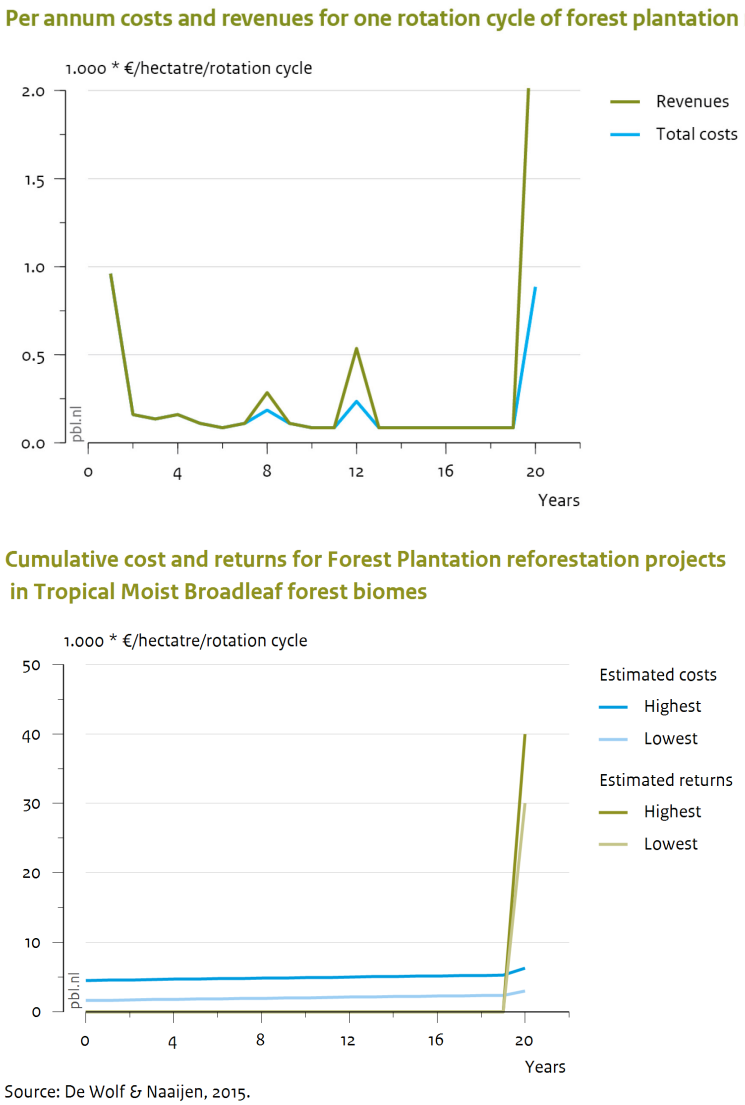


Figure 3: Return on investment of restoration in degraded ecosystems against time. Top figure is an illustrative example showing that costs and returns vary over the cropping cycle of forest plantation restoration. The bottom figure shows that there is a delay between cost and returns, but that returns are in general higher for forest plantation restoration.

The temporal delay in returns (Figure 3), which can last several years and goes hand-in-hand with investments in natural capital, increases the risk for investors used to or dependent on short-term cost recovery, and for whom land is a new asset — increasingly internationally observed and traded (SIANI, 2016). Even for institutional investors such as pension funds, for which long-term returns are more suited, the lack of an investment track record still makes restoration initiatives a high risk investment (see Section 2.1.3). Short and long-term returns can be generated through clever project design, such as that of the plantation and native tree planting project in Brazil which is based on a 10-year cropping cycle (Brancalion, Viani, Strassburg, & Rodrigues, 2012), though this also increases

monitoring & enforcement costs (2.3.3) to ensure cost returns are achieved both in the short and long term.

Furthermore, institutional investors are required by law to have a certain percentage of their deal flow as liquefiable[13] assets. In restoration initiatives, the limited returns of the first 5-10 years and the collateral[14] are not easily liquefiable and therefore problematic for institutional investors who perceive ESR investments as high risk[15]. Difficulties can occur where collateral has not been properly established, such as formal and informal land user rights, or where collateral cannot be monetised. Liquidity is also a concern for smaller organisations that do not have the collateral to access finance for their larger restoration projects (Credit Suisse & McKinsey Center for Business and Environment, 2016), and see their opportunities for scaling up bottom-up approaches as severely limited.

Public support through regulation and funding to develop an investment track record could aim to attract impact investments and thereby leverage institutional investments. An example is wetland restoration in the USA, which has a high involvement of institutional investors, via the Wetland Mitigation Banking credit market (Box 7).

Box 7 **Involvement of institutional investors**

USA Wetland Mitigation Banking

Wetland Mitigation Banking in the USA works through federal, state and local government requirements to mitigate the disturbance or destruction of wetlands. An approved mitigation bank can sell credits to developers in order to compensate for this damage, be it on-site or in-kind (USACE, 2008).

The scheme stems from the 1972 Clean Water Act, which made efforts to combat the decline of wetland ecosystems and pushed for zero net loss of wetlands by enforcing the mitigation hierarchy: avoidance, minimisation, restoration and offsetting of detrimental impacts. Two factors have helped to build a resilient track record for restoration initiatives to the point where more than 1,900 commercial mitigation banks have been established since 1991: the consistent demand for mitigation credits by large energy and infrastructure projects, and the clear guidance and enforcement rules for mitigation banks formulated by the U.S. Department of Agriculture, U.S. Army Corps of Engineers (USACE), U.S. Fish & Wildlife Service (FWS), and the Environmental Protection Agency (EPA).

This strong track record of protection of over 90,000 ha of wetlands, in addition to stable returns through consistent demand for credits, political support and a market for mitigation credits, has reduced investment risks to such an extent that pension funds are now investing. In 2012, Ecosystem Investment Partners, a private equity firm, closed its second fund, raising 181 million USD from pension funds, endowments, and high-net-worth family offices, all of whom were attracted to the high and consistent demand for credits relating to offsetting the impacts of energy and infrastructure projects, with very few impact investors involved. In some areas, such as the Everglades, the restoration business has reached such maturity that green bonds are commonplace (Department of Environmental Protection, Florida, 2015). This shows how policy can create an enabling environment to catalyse private sector investment in wetlands, and that building a strong market demand can reduce the risks for institutional investors.

[13] For collateral, or security, see below; for "liquidity", see the Glossary.
[14] Collateral is a borrower's pledge or offer of specific property to a lender, made to secure a loan. It can be seized by the lender to recoup a loss when the borrower fails to repay the loan.
[15] This is not so much an issue in the short term, as it is better to have more risk-inclined investors such as impact investors, to make the early investment. However in the long run, when risks are reduced and projects are more mature, institutional investors need to be able to invest in these kinds of projects.

Despite its many successes, wetland mitigation banking and other offsetting derivatives are criticised for inadequate monitoring and enforcement of safeguards, such as the quality and location of offset and banking sites (Lapeyre, Froger, & Hrabanski, 2015), which is particularly due to the transfer of monitoring responsibilities from the government to individual commercial wetland banks (Quetier & Lavorel, 2011). In addition, the lack of decision making guidelines on whether an offset is appropriate in the mitigation hierarchy resulted in a rapid uptake of offsetting, as it was seen as an easy way to decrease project costs and efforts, rather than more difficult efforts to avoid the loss of primary ecosystems (Fitzsimons, Heiner, McKenney, Sochi, & Kiesecker, 2014).

The form of returns also makes financing projects more complex for private investors. Public returns can be difficult to monetise and capture in markets[16], which means cost recovery is limited. Private investors will often only invest if the private benefits captured are substantial and marketable (Loomis, Kent, Strange, Fausch, & Covich, 2000). This shows the need for public funds to cover public goods. This is primarily an issue for supporting, regulatory and cultural services where user rights are more difficult to define. Land and tenure rights also need to be clearly defined to have an impact on potential profits for local stakeholders. For a low-income stakeholder, reaping profit depends on access to the area, whether land or water, and project organisation. Increased complexity in monetising or marketing restoration benefits results in higher organisation and representation costs (2.3.2) and monitoring and enforcement costs (2.3.3).

The extent to which a good is rival or excludable (Figure 4) plays an important role when considering cost recovery mechanisms. This is reflected in the design of governance and Payment for Ecosystem Services (PES) schemes. For example, user financed PES is easier for private goods and club goods, where there is an element of excludability, than for public or common goods, where there is a higher chance of free-riding and considerable transaction costs. Public goods and common goods are better suited to government financed PES schemes, which can help to reduce transaction costs due to the scale of action (Fisher, Turner, & Morling, 2009).

	Non-excludable	**Excludable**
Non-rival	Public Goods *air, biodiversity, public parks,*	Club Goods *watershed services (water regulation), scenic views from private lands, ecotourism*
Rival	Common Goods *groundwater aquifers, forests, grazing lands*	Private Goods *timber, fish, agricultural produce, water rights*

Figure 4: Goods can be classified according to their degree of rivalry and excludability. Public goods are non-rival and non-excludable. Non-rivalry means that consumption of a good by an individual does not reduce the availability of the good for others to consume. Non-excludability means that no one can be excluded from using a good (Kahn, 2005).

[16] Benefits are difficult to measure as up to 80% of ecosystem service values are not captured by markets, and are often transboundary public goods, which flow to beneficiaries whether or not they contribute to restoration (de Groot et al., 2013).

The geographical scale of returns also contributes to difficulties in cost recovery. Returns from ESR may occur downstream[17] (Figure 5) from where investments are made, though downstream users are difficult to exclude from receiving these returns, which can be public or non-monetary. This makes financing projects more complex for private investors. In addition, the transboundary nature of returns means that ecosystem boundaries often do not coincide with administrative boundaries, which leads to higher organisation costs (2.3.2) between buyers and sellers of ecosystem services to create the required institutions and coordination mechanisms, such as Payments for Ecosystem Services schemes (PES) (Section 2.2).

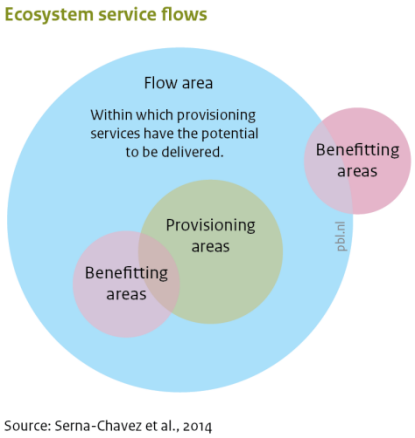


Figure 5: Serna-Chavez et al., (2014) use a framework to analyse and quantify ecosystem service flows. The green circle represents the provisioning area, i.e. a restored area providing ecosystem services. The pink circles represent benefitting areas, where pink overlapping green/blue provides and benefits, and pink overlapping blue benefits but doesn't aid provisioning, i.e. downstream water users. The blue circle represents the flow area within which provisioning services have the potential to be delivered, i.e. watershed watershed area.

The complexity of the variation in returns can be illustrated with the example of a degraded area where reforestation takes place. First of all, the forest takes time to grow and deliver returns. At the local level, these may be private returns that are earned from the outset, such as employment in restoration and maintenance, and in timber production. The increased availability of fuelwood is an example of a resulting common good, whose value depends on the accessibility of the site. Pure public returns will be the effect on water regulation (watershed) at the local and regional levels and the potential for carbon sequestration at the global level. The former will require designing and implementing a cost return mechanism, if the costs are to be borne by the beneficiaries, whereas for the latter, international markets already exist and can be tapped into (Elmqvist, et al., 2015).

2.1.3. Risks and uncertainty

Risk and uncertainty both play a role in limiting the availability of finance for ESR. Uncertainty exists in terms of the variations in start-up investment and maintenance costs (i.e. worst and best case BCRs) and risk in terms of the form, location and timing of investment returns. Risk and uncertainty of ESR projects can act as a barrier to long-term institutional investments, especially for large projects with many stakeholders and

[17] Downstream: at a geographical distance away from the restoration site

overlapping jurisdictions. Investment risks generally fall within the following six categories (Initiative 20x20, 2014).

- **Novelty –** This refers to the lack of a market track record and the presence of small and scattered known opportunities. At present, the average estimated returns on larger investments in ESR do not outweigh the associated novelty risk. This is an issue for SMEs[18] which are too small to apply for institutional investments and too big to receive microfinancing and therefore lack adequate and easy to access funding.

- **Externality** – The difficulty in monetising many of the social benefits, and uncertainties of linkages and trade-offs between various ecosystem services, where a focus on one ecosystem service may undermine the resilience of another (Norgaard, 2010). This also includes the risk of natural hazards.

- **Longevity** – This is the risk posed by the long time scales required for projects to reach maturity and the associated long-term exit strategies, which are required for good project delivery and returns.

- **Capacity** – Particularly important in less developed countries, this concerns adequate capacity for monitoring and enforcement (see 2.3.3), and the availability of infrastructure, management and knowledge.

- **Technical** – This refers to the level of difficulty of restoring land in heavily degraded or degrading areas, and of addressing the interests of the various stakeholders, providing technical assistance and dealing with the lack of simple measurable indicators of success.

- **Regulatory -** These are risks which stem from issues on the reliability of contracts, clarity of tenure rights, law enforcement, governance and the level of political stability. Risks also arise for local land users in terms of changing land use, effects on tenure arrangements and impacts on livelihoods, which requires participatory approaches and planning.

These risks also play a role in many other sectors, including agriculture, renewable energy and infrastructure, and often lead to the same financing issues, particularly in less developed countries due to governance failures (Ruete, 2015) (Box 8).

" *[For renewable energy] in the beginning that was really exotic and no one wanted to finance the risk…when you have a pioneering financier you are showing that it works and*

[18] Small and medium-sized enterprises. These are companies with 50 to 250 employees, said to be responsible for driving innovation and competition in many economic sectors.

now its mainstream; you need to do it [ESR] and show the results and that it works, and get a clear picture for investors"

- Hans Schut, Commonland

In order to unlock private capital at scale, there is a need to deliver competitive, risk-adjusted returns[19], provide access to finance and lay down strong enabling conditions (Christophersen, 2015) (Credit Suisse & McKinsey Center for Business and Environment, 2016). This is especially important, as, since the 2008 banking crisis, the financial sector has increased regulation and become less willing to take risks on novel developments. This applies particularly to the large institutional investors ESR financing depends on. Building a track record is therefore the key to reducing risk for larger investments in ESR.

Box 8 **Investment funds, institutional investors and the infrastructure sector in less developed countries**

The risks we see for ESR are also present in other sectors. In less developed countries, increasing competition for diminishing government budgets, known as the "global infrastructure gap", has resulted in government support for the creation of Public-Private Partnerships (PPPs), investment funds and innovative project bonds and guarantee mechanisms (Deau & Touati, 2014). For example, the National Infrastructure Fund (FONADIN) in Mexico delivers grants, subsidies, subordinated debt and guarantees to a pipeline project worth 18 billion USD. Private sector guarantees cover public sector political and management risks of investments in PPP infrastructure projects.

Deau & Touati (2014) highlight that governments can facilitate scaling-up investments by (1) providing a clear pipeline of concrete opportunities including precise guidelines and timelines, (2) providing greater visibility and predictability of cash flows through PPP frameworks, (3) introducing financial regulation to ensure economic and financial stability, (4) addressing market failures directly or indirectly through development banks and (5) acting as facilitators and providing credibility to investments, in addition to providing seed funding and guarantees. The main challenge ahead for these efforts is to ensure proper PPP regulations, stability and long-term political commitment, simplified procedures and appropriate allocation of risks (Benavente Donayre & de la Torre Lastarria, 2011). Moreover, PPP regulation must be coherent. In Indonesia, there are over 45 laws and regulations governing PPPs, but they have contradictions and there are overlaps between sectors and levels of government, resulting in widespread confusion and complex administrative procedures. Consequently, while there is support for PPPs, their projects are only carried out as a last resort (Lin, 2014). At present, Latin America and the Caribbean have the most welcoming investment environment for PPPs (IDB, 2015).

With regard to drawing in larger institutional investors such as pension funds, governments need to address liquidity issues. In Colombia this was done by changing public and private pension fund legislation so that a specific percentage of their portfolio consisted of infrastructure investments, and addressed limited capital markets through the Pacific Alliance which provides coordination with neighbouring countries (Escobar, 2015). For climate mitigation projects, green bonds issued by bodies such as the World Bank can help to alleviate the liquidity issue, though, as the market is still small, there is still some reluctance to invest.

In comparison to other sectors, infrastructure projects in less developed countries scale up by sharing expertise and technical assistance from existing networks in other countries. ESR projects could also catch onto this idea, through organisations such as the Global Environment Facility (GEF),the World Bank, various development banks moving into the area of restoration and smaller NGOs working on regional and local levels.

Investors in the infrastructure sector are also entering the restoration arena, particularly where

[19] Risk adjusted return – a concept that measures how much risk is involved in producing a specific return, expressed as a number or a rating.

infrastructure and restoration can be combined. For example in Bavaria, Germany, the regional government and major electricity suppliers agreed on investments in hydropower, combined with restoration of the region's main water bodies (Haselbauer & Gohl, 2010). In Colombia, a leading company in the pork processing industry reforested the regional watershed to reduce water shortage risks, while conserving natural vegetation (Heuberger, 2016). Infrastructure investments are increasingly occurring through dedicated fund management companies such as DIF[20], who broker for investors with a pipeline of projects through various pooled finance funds. Public funding is used to guarantee payments. These are the types of institutions that need to start operating in the field of ESR.

ESR activities are similar to other infrastructure activities, facing many of the same risks, but with slow maturity rates and potentially high net returns. There are calls for ecological infrastructure to be quantified in the same way as man-made infrastructure (Watt, 2015). However, given the lack of an ESR investment track record, the risks are still high on issues for which other sectors can draw from their own field's track record. Knowledge sharing on successful projects and government support or participation is therefore the key to scaling up investments in ESR, for example through network building.

Summary

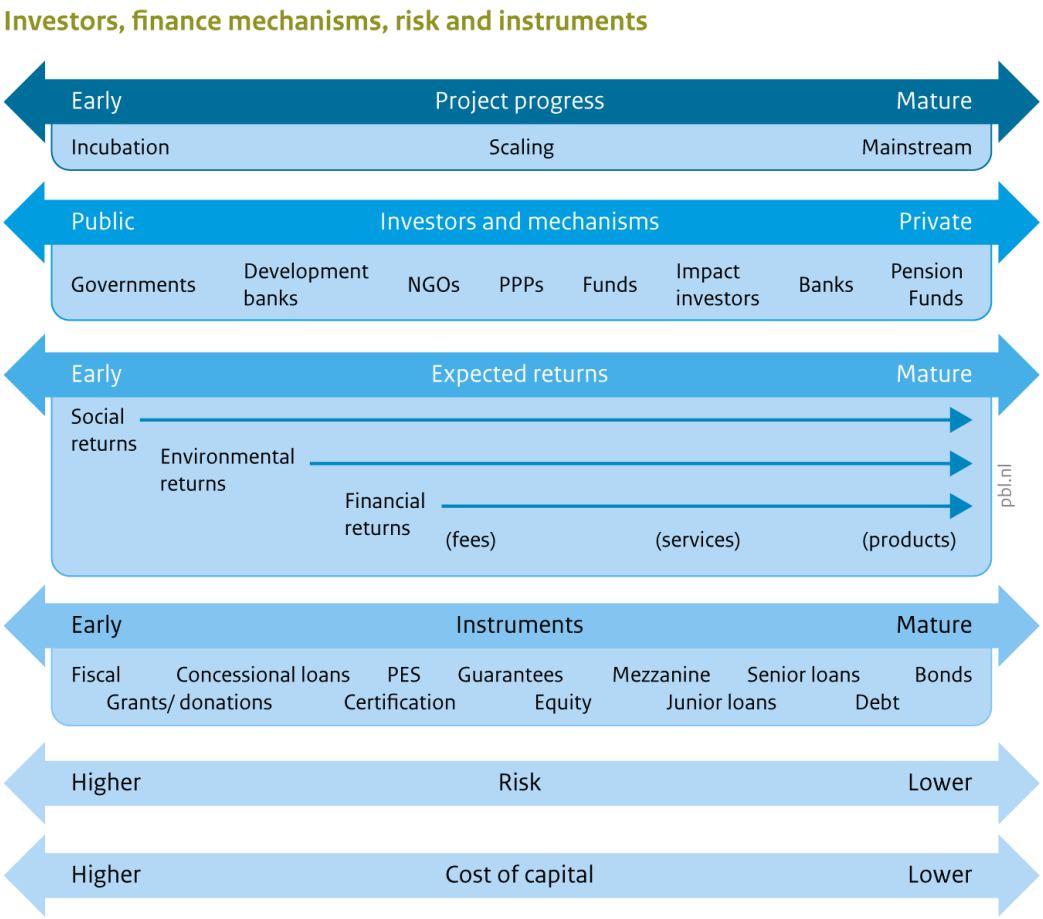
- There are several risks which provide obstacles to clear exit strategies and therefore limit investor interest.
- Other infrastructure sectors have moved towards integrating guarantees into deals, in order to reduce risk.
- Opportunities lie in coordination mechanisms to decrease costs, which, in turn, helps to decrease investment risk. Examples are the establishment of Public-Private Partnerships, knowledge brokers and investment funds developing investment pipelines. Policy makers can help to create an enabling environment for such mechanisms (this is discussed further in Section 2.3).

2.2. Financing mechanisms to address issues

Various financing mechanisms exist, which use various instruments that can help to address finance issues. Different instruments are required for different risk profiles, timescales and expected returns (Figure 6), but they can be combined in a coordinated fashion to increase the availability of adequate and sustainable finance for ESR. They can be subdivided into

- **enabling instruments**, which help to reduce the cost and risk of investment in order to leverage long-term financing and guarantee social returns and
- **asset instruments**, which help to deliver return on investment, including more traditional instruments (equity, debt) and
- **market-based instruments** which help to align public and private interests (green bonds, PES, offsetting, insurance) (Elson, 2012) (Shames & Scherr, 2015).

[20] See http://www.dif.eu/en/dif/about-us/



Source: Several sources; compiled and edited by PBL 2016

Figure 6: Investors, investment mechanisms and expected returns

Enabling instruments are those that both aim to reduce the cost and risk of investment and enforce social returns, which is particularly important when private sector funding is used for the public restoration of ecosystems. Enabling instruments can help to improve readiness of projects for larger investments, strengthen governance and challenge damaging development pathways, essential to the implementation of asset and market based mechanisms and therefore to the local implementation of financing for ESR. Enabling instruments are generally managed by the public sector[21] in terms of donors and guarantors, and include:

- **Grants and technical assistance** - meant to reduce initial costs, these can be directed to local land users in order to support bottom-up initiatives and local knowledge and expertise;
- **Fiscal incentives and law -** this concerns taxes, permits and subsidies to reduce opportunity costs of restoration free-riding and leakage, and enforce public good delivery;
- **Regulation** - supporting the development of various instruments such as PES and PPPs, this also ensures land tenure security and law enforcement;

[21] See Glossary

- **Risk reduction and first loss guarantees** - these are often applied by Development Finance Institutions (DFIs).

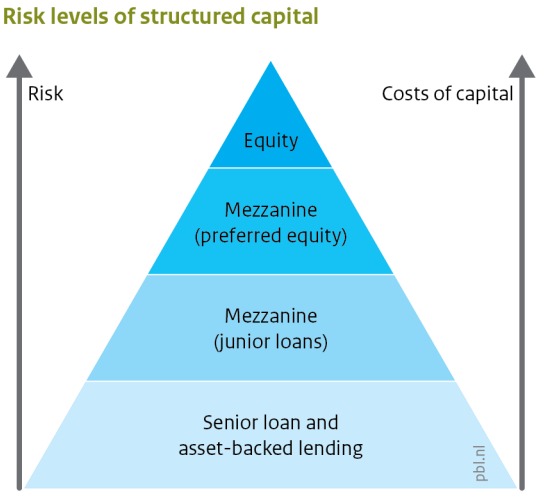
Guarantees are gaining popularity and are one of the most successful methods for development finance to mobilise private finance[22] (OECD, 2015). For example, the Development Bank of Latin America (CAF) is setting up a partial risk guarantee for private equity impact investors involved in Initiative 20x20, to reduce the risk for their investments (FAO & Global Mechanism of the UNCCD, 2015), and USAID has provided the Althelia Climate Fund with a 134 million USD risk sharing guarantee (USAID Press Office, 2014). Availability of low-cost public capital through government support can also help to leverage private capital in developing countries, by reducing upfront costs for investors, whilst also being profitable[23].

Public finance plays a key role in supporting investments in ESR as public returns are often only realised in the long term[24] (Bullock, Aronson, Newton, Pywell, & Rey-Benayas, 2011). Enabling instruments allow public actors to define how private actors invest by implementing safeguards for investments. For example, publicly financed grants and partial risk guarantees can be combined to reduce the risk and cost for larger private investments such as equities and loans, though only on the condition of public good delivery. Safeguards are in place at the institutional investor level, such as the IFC's environmental and social performance standards, the EIB Statement of Environmental and Social Principles and Standards, the Voluntary Guidelines for Responsible Governance of Tenure (VGGT) and the requirements of Free, Prior and Informed Consent (FPIC)– all of which are crucial to ensure respect for the environmental and local land tenure rights. However, lessons learned from Reducing Emissions from Deforestation and forest Degradation (REDD+) (Box 9) show that the identification and implementation of these standards and safeguards are still in development at the local level given contextual difficulties, particularly regarding the prevention of land grabbing and ensuring benefits for local stakeholders.

With asset investments being primarily the territory of private sector[25] investors, asset instruments cover:

- Traditional mechanisms such as equity and debt
- Mezzanine and quasi-equity financing variations that lie in-between the previous two (Figure 7)

[22] A DAC study showed that a total of 36.4 billion USD was mobilised from the private sector between 2012-2014 through official development finance interventions (guarantees, syndicated loans and shares in collective investment vehicles such as investment funds). Guarantees were able to mobilise the largest part (59%) followed by syndicated loans (23%) and shares (18%). Sectors targeted were energy, banking and industry, mostly in middle income countries. 19% was climate mitigation related.
[23] For example, the UK Green Investment Bank expects to earn taxpayers a return of 10% in 2015. (Koch-Weser, 2016)
[24] Time lags can range from 1-2000 years, depending on the aim and scale of the particular restoration activities (Gradinaru, 2014).
[25] See Glossary



Source: OECD, 2014.

Figure 7: Structured capital can be implemented at different risk and capital cost levels. For higher risk levels, senior loans and asset-backed lending are favoured, posing an issue for ESR projects with lack of collateral in the early stages of execution or where there is a lack of clear property rights and tenure. Source: (OECD, 2014)

'Innovative' market based instruments can help to align public and private interests, including PES schemes, carbon offsetting schemes, Debt-for-Nature swaps[26], Green Bonds, and certification. These all help to increase the availability of financing through the monetisation of public goods such as water and carbon, and provide extra liquidity to investors. These mechanisms can be applied on a one-off basis or recurrently.
Market based incentives, such as Payment for Ecosystem Services (PES) schemes, can help to generate local financing while certification[27] may help to integrate the cost of public good provisioning into prices. Green bonds can help to provide immediate and long-term returns in efforts to attract larger institutional investors. However, while there is a move towards a greater use of market-based mechanisms, most of these instruments, except certification, are not fully developed yet or are only suitable for the later, lower risk stages of ESR projects. This is case of green bonds[28], which borrow against future savings (Watt, 2015). Nevertheless, with the observation that the green bond market for environmentally-friendly investments reached 50 billion USD in 2014 (The Economist, 2014), opportunities for the development of restoration bonds are favourable.

Often a combination of financing instruments is required as different ecosystem services are likely to require different mechanisms to deliver investment returns. For example, where physical products are obtained, such as timber, crops and non-timber forest products,

[26] such as the one established between Brazil and the USA, which involved swapping 21 million USD of debt in exchange for Atlantic Forest restoration
[27] Such as the Forest Stewardship Council (FSC) where certified producers
"should complement the management of, reduce pressures on, and promote the restoration and conservation of natural forest" (FSC, 2010)
[28] Green Bonds require larger deal sizes starting from 100 million USD upwards, and depend on strong credit ratings. More accessible versions include TNC's Nature Conservation Notes (Credit Suisse & McKinsey Center for Business and Environment, 2016)

certification can play a role. Other public goods can be delivered through PES schemes, such as fees for water or carbon users. The complexity of distributing different returns to different beneficiaries at different spatial and temporal scales is the reason coordination is crucial in many restoration projects (see 2.3).

Box 9 **PES, REDD+ and Costa Rica**

PES is an innovative mechanism addressing the transboundary nature of ecosystem services, linking payments from downstream users to the activities of upstream landowners, on condition of a particular ecosystem service delivery, such as water. In terms of social returns, while PES allows for monetisation of public goods, in some cases it may be skewed to favour specific services based on the needs of the buyer.

Success of a PES project may depend on the extent to which the ecosystem service(s) being bought are rival/excludable. Private or club goods are better suited to user financed PES, than public/common pool resources, where there is a higher chance of free-riding and considerable transaction costs. In these situations, top-down, government financed PES schemes are more suitable, reducing transaction costs through economies of scale (OECD, 2010). Government financed PES schemes are more successful if complemented by government regulations that reduce free-riding, such as those adopted in Costa Rica.

Costa Rica
A PES scheme has existed in Costa Rica since 1996 for carbon, hydrological, biodiversity and scenic ecosystem services. Run by the government, they use a push-and-pull technique of legal enforcement to halt deforestation and decrease free-riding practices. The PES schemes offer help towards good practices, tax breaks and public loans, demanding long-term commitment to restoration in return. Cost recovery is simplified by using existing administrative structures (Engel, Pagiola, & Wunder, 2008).

However, there are still two unresolved issues in government financed PES in Costa Rica. First of all, there is a lack of clear tenure rights and prevalence of public land endowed with ”bundles of rights” has resulted in conflicts, particularly with regard to REDD+ programmes (Corbera, Estrada, May, Navarro, & Pacheco, 2011). The second issue is lack of additionality: those who own low-value land also participate in PES schemes, meaning that up to 71% of forest protection contracts are on land with limited or no agricultural use, due to untargeted payments.

REDD+ may provide the solution. To receive payments, countries need to adhere to seven agreed upon safeguards, which include respecting the knowledge and rights of local stakeholders and ensuring the conservation of biological diversity. The aim is to ensure the delivery of public and non-monetary goods and that costs are recouped. REDD+ safeguards also have the potential to develop a robust enabling environment that helps to manage and mitigate risk, and as such helps to catalyse private investments (Christophersen, 2015). Costa Rica is currently working towards REDD+ readiness, i.e. compliance with safeguards, through help provided by a ”readiness fund” for creating an enabling environment, followed by a ”carbon fund” for asset investments in emission reduction programmes (REDD+ Costa Rica, 2015). However, it is not easy to establish the social and environmental safeguards that are essential to the credibility of REDD+, given the lack of public funds and capacity, and the political unwillingness to establish adequate monitoring and reporting (Martius, 2015).

Summary

- There is no single, perfect finance instrument — combinations of instruments need to be employed, given the various project risk profiles and expected returns.
- Enabling instruments help to link public and private finance by reducing risk and cost, safeguarding the social returns of investment and leveraging the availability of private, asset-based finance.
- Asset instruments and market based instruments also attempt to do this, by securing the cost recovery of public good provisioning through, for example, water and carbon fees, thereby helping to increase the availability of finance.

2.3. Coordination issues

Coordinating activities across scales and actors is challenging, particularly when, as for ESR, the range of stakeholders is extensive. Private investors, national governments, international non-governmental organisations, regional development banks and local user groups all need to be involved in ESR projects, each with their own interests, values, timelines and decision-making processes. Following project implementation, investments need to be maintained and resources managed, requiring effective governance mechanisms across actors and scales. Williamson (1991) argues that institutions are required to effectively coordinate and manage activities, though in the case of ESR, there is a lack of coordinating institutions.

The multiple level and multiple actor nature of ESR projects is a consequence of the multi-dimensional nature of ecosystems and ecosystem services themselves. For example, restoring a watershed generates benefits for local stakeholders, such as improved agricultural productivity, but also for regional stakeholders who may enjoy better water regulation, and global stakeholders benefitting from effects such as enhanced carbon storage. As a consequence, global and regional stakeholders may be willing to contribute to watershed restoration, but for restoration to materialise it is necessary that regional and global contributions reach local stakeholders, since they are in the best position to implement restoration projects and maintain them in the long run, or may already be running sustainable restoration projects that require scaling up and strengthening (Engel, Pagiola, & Wunder, 2008).

It is beyond the scope of this paper to address all the coordination issues pertaining to the successful scaling up of ESR projects, but in relation to financing it is important to consider a few key questions that have the potential to reduce the financing issues described in Section 2.1. We focus specifically on three coordination issues, which have a great impact on the costs of ESR:

- **Search and information costs:** Securing sufficient return on investment requires effective targeting and prioritisation, information on the biophysical characteristics of the ecosystem and, to determine investment returns, information on its socio-economic conditions. Local participation reduces the costs of optimal targeting, but requires organisation. Given the context specificity of ESR projects, there are no blueprints, which imply that search and information costs are high.

- **Organisation and representation**: Often, the beneficiaries of ESR are not well organised, and nor are the actors required to make the investments on the ground. Organising various stakeholders, ensuring that their interests are well represented, and making sure decision making processes and coordination are effective all require substantial organisational investments, particularly where there is a lack of (local) institutions.

- **Monitoring and enforcement:** there needs to be agreement on how responsibilities are allocated and how the costs and benefits of ESR are shared. In addition, long-term maintenance requires sustainable resource management, which means effective governance mechanisms are needed for monitoring and enforcement of restricted resource use, in order to guarantee returns.

2.3.1. Search and information costs

With high-risk investments and uncertainty about start-up costs, there is a need to secure sufficient return on investment. This requires targeting and prioritisation of ESR projects. Prioritisation can help guide optimal financial resource allocation at national and supranational levels, but the information required for prioritisation is sparse (Dietzel & Maes, 2015) and harvesting the wealth of practical experience of restoration is a challenge that is often neglected (Menz, Dixon, & Hobbs, 2013). Furthermore, search and information costs are increasing, as we move away from simple, single ecosystem reforestation projects and small-scale projects to ESR projects at the landscape level. However, these costs can be reduced by using local knowledge, knowledge brokers, and the development of better mapping and models.

Top-down site selection and implementation may seem the most efficient approach, but using collective experience and expertise by involving local actors and adopting existing local restoration practices can substantially reduce investment and maintenance costs in later stages (Kerr, 2007) (Rodrigues, Lima, Gandolfi, & Nave, 2009). For example, local actors often know best which land produces the highest agricultural yield, where rainfall is highest and in which parts of the watershed grazing can most fully be controlled. Biogeophysical data is available through remote sensing[29], but often the combination of scientific and local contextual information works best (Danielsen, et al., 2009). However, coordinating local actors in information sharing processes is time consuming, especially when actors are not organised, and when local knowledge about ecosystem functioning is also limited.

The emergence of knowledge brokers[30] (Box 10) is promising, as these actors are able to reduce search and information costs through the co-production and sharing of knowledge among several stakeholder groups. Knowledge brokers can also help to provide clarity on acceptable trade-offs among competing objectives where policy meets environmental reality (Baker, Eckerberg, & Zachrisson, 2014). Increasing the availability of information in order to prioritise investments, for example through efforts such as the Global Opportunity Report[31], helps to reduce start-up costs, the risk of investment and uncertainty about investment returns (Kotiaho, 2015). Knowledge brokers are not the result of specific regulations or

[29] For example, data on deforestation rates collected via satellites, in contrast to on-site data collection.
[30] Defined by Fazey et al., (2013) as actors who "absorb complex ambivalent messages from diverse sources including technical, commercial and legislative developments and translate them into terms that can be understood and acted upon".
[31] See http://globalopportunitynetwork.org/the-2015-global-opportunity-report.pdf

institutional arrangements but rather they are initiatives emerging from the private sector, including investment banks, funds and NGOs, which can also help to standardise knowledge collecting processes. For example, Credit Suisse & McKinsey Center for Business and Environment (2016) are developing a project investability funnel, focussing on investment criteria. However, the identification of knowledge brokers is a crucial and context specific task given the need to understand local power relations, practices and expertise, maintain trust and impartiality, while having the potential to link bottom-up and top-down processes (pers. comm, Both Ends, 2016).

Box 10 **Knowledge brokers**

Knowledge brokers can reduce search and information costs, and link bottom-up with top-down processes. In the renewable infrastructure sector, the UK Green Investment Bank also functions as a knowledge broker for small and large investors in innovative and risky renewable infrastructure projects. Not only does the brokering and sharing of this knowledge allow for better project targeting, it also leads to a better understanding of the risks and uncertainty about returns, and therefore reduces the risk for co-investors.

For ESR, the volume of knowledge brokering is very much smaller. While knowledge brokering occurs on the global level, such as through the GEF and UNCCD, there is a need for knowledge brokers at the local and regional levels, which take bottom-up, local knowledge into account.

One such approach is employed by the NGO Living Lands in partnership with the Commonland Foundation[32] in the South African catchment areas Baviaanskloof, Kouga and Kromme. These areas were prioritised for restoration because their combined surface area of 500,000 ha supplies 70% of the water consumed in Port Elizabeth, which continually faces water stress and recently experienced one of its worst droughts (2009-10). Following a process of mapping, brokering of local and university knowledge, and building a network of knowledge sharing, a restoration project was developed. This included creating understanding for the need for restoration and developing local partnerships, alternative business models and bottom-up leadership structures. The efforts made by Living Lands were combined with business development support and funding from Commonland, enabling the Commonland supported development company[33] to step in and help scale up the project to provide proof of concept and demonstrate the intrinsic value of restoration at the local level.

Commonland developed a holistic landscape restoration approach, providing project management and stakeholder orchestration, business development support, technical assistance and financial structuring support for alternative land use and farming business models that restore the landscape in the long term. Commonland also supports restoration businesses in (financial) structuring and raising finance. Through changing and scaling up existing efforts to build local business cases that create returns for the local farmers and landowners, Commonland aims to create a track record to demonstrate project viability and investment risks for large impact and institutional investors and insurance firms (Barbee, 2015). The idea of "passion capital" or "intrinsic value" helps to shift the focus of traditional investors to long-term returns. There is intrinsic motivation on the ground, long-term willingness and a favourable risk-return profile, though financing will be needed to maintain and enable this motivation (Ferwerda, 2015). The Moringa Fund and the Livelihoods Fund also use this approach.

"You can't tell people what to do or what they need to do, it needs to be on their agenda not ours, especially if you want large scale action over the long term…where is there energy and opportunity?"
Dieter van den Broeck, Living Lands-Commonland

[33] Four Returns PtY

More accurate maps and models of national restoration potential are a key element in prioritising ESR projects and ensuring investment returns. To help national governments achieve global goals such as the Bonn Challenge, many efforts are made to obtain more detailed assessments. One of these is the Restoration Opportunities Assessment Methodology (ROAM) which was developed by the IUCN and WRI to further forest landscape restoration. It also considers biophysical and socio-economic indicators, in an effort to provide more nuanced and detailed pictures of the suitability of locations for restoration and types of restoration measures[34]. On a more global, biophysical scale, PBL Netherlands Environmental Assessment Agency is modelling the global restoration potential, the details of which are to be published shortly.

2.3.2. Organisation and representation

Given the lack of institutions to coordinate the demand and supply of ESR projects and financing, the organisation (or transaction) costs of ESR are often high. On the practical side, ESR requires the setting up of organisation(s) to coordinate activities at the local and regional levels and safeguard and represent the interests of both the public and the private stakeholders. Decision-making processes and rules are key ingredients for streamlining communication among multiple stakeholders at various levels, particularly where there are conflicting interests or trade-offs (van Oosten, 2013a) (van Oosten, 2013b). As for financing, the coordinating organisations are required to broker deals between projects and financing parties. Since the project's risk profile changes over time, different sources of financing are required, ranging from mainstream institutional bodies during the incubation stage to investment funds when the project is more mature.

> *"The difficulty is to find the entrepreneurs, the implementers with a sufficient level of maturity to develop these activities on the ground in difficult contexts… In our case we really need to spend a lot of time to co-construct the projects with them. These are important up-front costs that investment funds usually do not have to bear".*
>
> *Clement Chenost, Moringa Fund*

In the past, ESR was typically implemented by government agencies of countries such as China, South Korea and Ecuador (Bae, et al., 2014) (Yin & Zhao, 2012) which planned their activities centrally and in some cases hardly consulted the local stakeholders (Murcia, et al., 2015). This often led to problems of inefficient targeting of activities, lack of maintenance or failure to effectively manage the ecosystem services on the ground (Yin & Zhao, 2012). In addition, government agencies are not known for being the most efficient organisations, thus increasing organisation costs. As result, more recent approaches that involve local beneficiaries in planning and implementation, such as community-based methods (CBM),

[34] ROAM involves executing several steps to create a more detailed picture of restoration opportunities, including stakeholder engagement, geospatial mapping, economic, financial and carbon analysis, review of enabling conditions and monitoring systems.

have become popular (Box 11). Furthermore, public-private partnerships (PPPs) have become popular at the landscape level as they help to create a common language for restoration, which has the potential to create a common vision across local-global levels and connect public and private actors (Brasser & Ferwerda, 2015).

Still, an enabling institutional environment is essential for scaling up ESR, given that in many degraded areas formal and informal property rights are not clearly defined. Without institutions representing the interests of the range of stakeholders and a properly functioning legal system, generating social returns will be difficult, as there will be no regulatory mechanisms in place to ensure smallholders enjoy the benefits. Furthermore, an enabling environment is necessary to acquire and allocate financial resources, to convene and coordinate projects between water basins and regions to lead the national restoration agenda, collaborate regionally and internationally and integrate restoration into development strategies (Murcia, et al., 2015).

Box 11 **CBM to reduce organisation and representation costs**

Community based methods (CBM) have become popular, but their effectiveness remains unclear (Mansuri and Rao 2004). Studies indicate that involving communities in project development and targeting improves project effectiveness significantly, but the effect on overall organisational costs has not been confirmed. Also, scaling up community-based projects is difficult as there is no blueprint for success: Ostrom (2009) lists over 50 factors which determine the effectiveness of community-based management, ranging from an enabling institutional environment, to social coherence, clear user rights and the right incentive structure. In addition, community involvement is often dominated by elites, and decentralised projects are not necessarily more effective at including low-income groups. As ESR projects are context specific, they need long time horizons and clear monitoring and a learning period. (Mansuri & Rao, 2004). Other methods include Participatory Land Use Planning (PLUP) (Both Ends, 2011) and the Negotiated Approach (Both Ends, 2011).

2.3.3. Monitoring and enforcement

ESR generates private, public and non-monetary benefits for buyers and sellers of ecosystem services at various levels. Private investors are sure to monitor the delivery of their private return on investment, but such monitoring and enforcement is also required for the public benefits. Given the multiple services and multiple actors involved in ESR, it is clearly not easy to monitor all activities and therefore monitoring costs will often be high. In addition, different types of investors are likely to get involved at different stages of an ESR project, according to the variations in expected returns, and in the risks and the costs of capital, all of which require monitoring over time. However, inadequate monitoring practices, restricted

access to monitoring data and a lack of consensus on standard evaluation criteria all make for difficulties in developing and comparing insights (Suding, 2011).

One method to reduce the complexity of agreements is to bundle ecosystem services, which reduces the need for trade-offs between them (Engel, Pagiola, & Wunder, 2008). However, examples show that where a private-sector market is involved, bundling ecosystem services is likely to increase start-up costs and monitoring and enforcement costs. For example, the system of Ecosystem Restoration Licences in Indonesia has opened up the market for ESR, but requires separate permits for each privatised commodity over a period of 60 years, resulting in increases in transaction and investment costs which were already high. One study estimated that 14-18 million USD is needed for the first 6 years of operation (Walsh, Hidayanto, Utomo, & Utomo, 2012). This could be addressed through the development of multiple commodity permits, though this requires enabling support from regulation and policy makers.

The primary challenge, therefore, is to design markets that incentivise private stakeholders to deliver ecosystem services at socially efficient levels (Kroeger & Casey, 2007). Strong regulatory frameworks[35] help to reduce risks, and PPPs which help to address the lack of incentive are becoming increasingly popular. They act as a means to implement policies and regulations and ensure quality of services beyond the requirements of regulations (Salzman & Ruhl, 2000). For example, public good delivery can be enforced in a PPP agreement by imposing it as a condition for a offering a guarantee or awarding a grant. However, this is only feasible if the public objectives and the contract are well designed and implemented (Bouma & Berkhout, 2015), or, as previously mentioned, there is intrinsic motivation and a clear business case for restoration at the local level (Box 10).

Other challenges include agreeing who carries the costs and who receives the benefits, ensuring these roles are fulfilled and promoting knowledge sharing and innovation. Much can be learnt from other sectors. such as climate change mitigation and water infrastructure, which have developed simplified approaches to solve these complex issues. Working with PPPs to address agreement, design and enforcement issues in the water sector may provide valuable lessons (BOX 12).

[35] For example - taxes, permits, subsidies, laws

Box 12 **Public-private Partnerships (PPPs)**

With decreasing government budgets and growing numbers of cross-sectoral projects, Public-Private Partnerships (PPPs) are becoming commonplace. Their effectiveness depends on (1) the knowledge and characteristics of the partners and their local embeddedness, (2) the design of the agreement and the allocation of risk, responsibilities, enforcement and monitoring at the local and regional levels and (3) the broader legal and institutional context. While PPPs may be useful with regard to capacity building, knowledge sharing, reducing information costs, naturally internalising externalities and aiding the development of innovative approaches, Bouma & Berkhout (2015) highlight some key concerns over the design, implementation and enforcement of agreements. They show that in many partnerships there is a focus on defining goals, but not on how those goals are aligned between the partners and how they can be met. Also, there is limited self-regulating capacity in most partnerships, and greater shares of private financing may compromise public returns.

When engaging in PPP platforms or projects, it is important to ensure that they have varied representation — both public and private, with NGOs representing the local level — a range of financing mechanisms to secure cost return and a high level of transparency to aid self-enforcement. The focus needs to be on linking funds directly to PPP projects, clear goal pathways and a proper balance between public objectives and the business case to deliver both public goods and ensure cost return, thereby enabling scaling up.

Summary

- Search and information costs can be reduced by employing local knowledge, knowledge brokers and the development of better mapping and models.
- Issues on organisation and representation costs can be addressed through the development of multi-stakeholder platforms (to organise the supply and demand of projects and sources of financing, such as investment funds), institutions (such as PPPs, to align local, regional, national and global interests) and an enabling environment, including regulations and laws.
- Monitoring and enforcement costs can be reduced by applying participatory approaches which ensure there is clear agreement on the roles of the stakeholders and on goals and responsibilities, particularly when a project involves multiple goals and trade-offs. Costs can also be reduced by developing institutions such as PPPs to support and enforce monitoring and standardised reporting.

2.4. Coordination mechanisms to address issues

Specific mechanisms are required to coordinate the various enabling and asset instruments available and also to represent the various stakeholder interests, coordinate knowledge in order to prioritise and target sites, link the available finance to projects on the ground and aid monitoring and enforcement to ensure service delivery along the timeline of an ESR project[36] and bring together buyers and sellers of ecosystem services (Figures 8 and 9). This is a vast task for one institution or mechanism alone, but national or regional efforts could enable bottom-up coordination and the development of sustainable finance markets to survive the exit of public funds. While at present, institutions and organisations are failing to address these issues, PPPs, Investment Funds and PES schemes are among the mechanisms that can provide support.

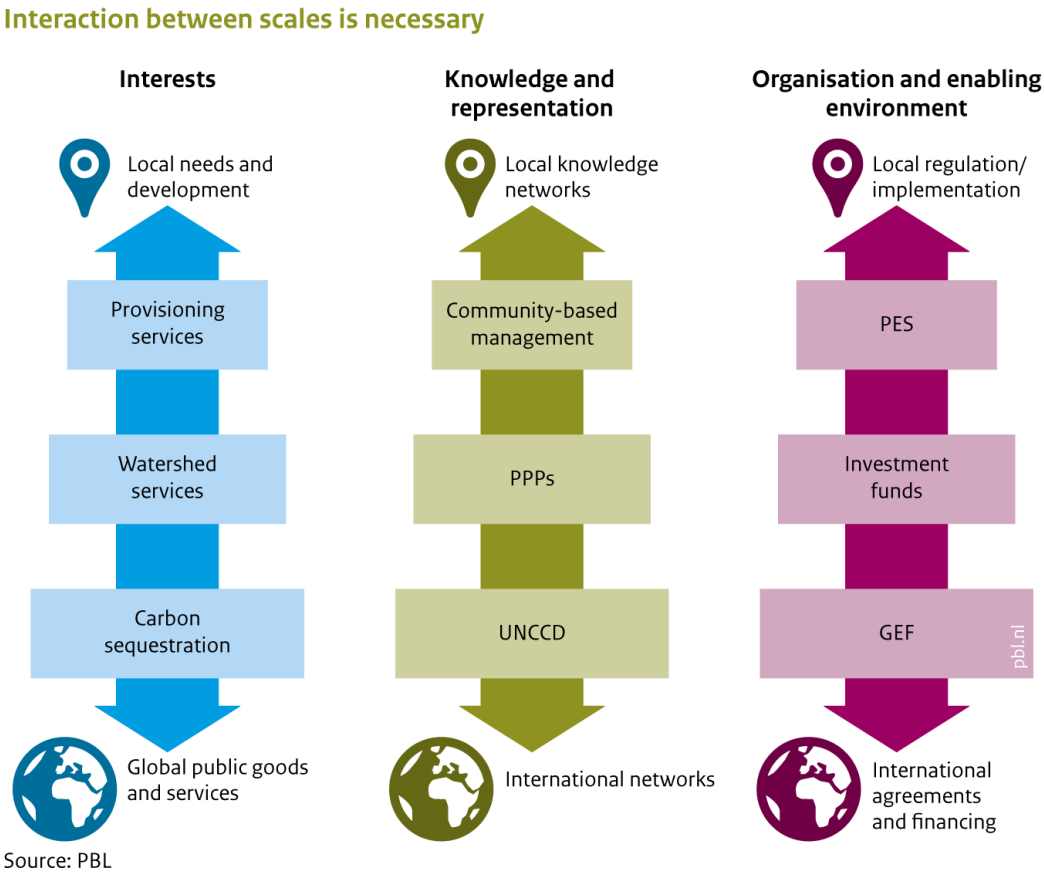


Figure 8: The multiple interests, platforms and coordination mechanisms at different scales

[36] For example, the public sector is more likely to be involved in the incubation phase of a project, which entails a high risk. But projects producing agricultural returns are more likely to attract private sector investors via equity or mezzanine financing, given the short-term returns and monetary benefits.

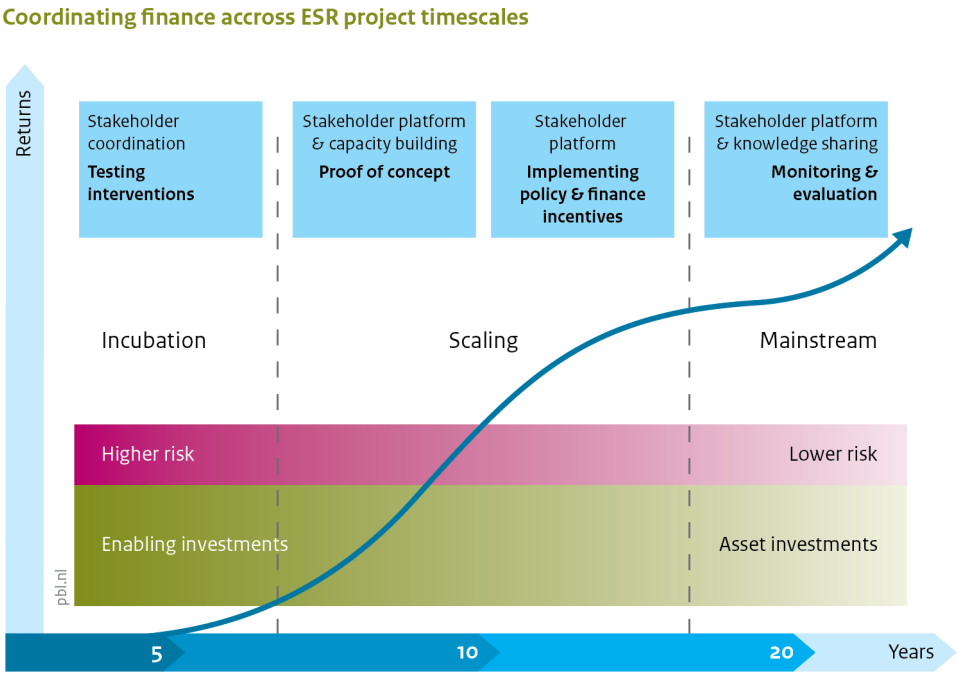


Figure 9: Investment types, risks, returns and stakeholders that need to be coordinated during the lifetime of an ESR project. Source: (Shames, Hill Clarvis, & Kissinger, 2014)

Public-private partnerships come in many forms. For example, the Imarisha Naivasha PPP in Kenya coordinates the stakeholders, their interests and activities in the Naivasha basin, monitors compliance and enforces appropriate practices. They also leverage funds from various international private sector retail and development partners (Denier, Scherr, Shames, Chatterton, Hovani, & Stam, 2015). PPPs allow for closer dialogue between stakeholders, provide access to diverse sources of finance and reduce investment risks due to greater trust between stakeholders. They are often set up in infrastructure sectors to leverage private finance where there is a lack of public finance, but the government needs to introduce regulations that support PPP development. Other examples of national and regional PPPs include the Southern Agricultural Growth Corridor of Tanzania (SAGCOT[37]) and the Atlantic Forest Restoration Pact (PACT).

PPP's can also function as knowledge brokers**,** though at present that role is primarily taken by public stakeholders at the global level, such as the UNCCD and the Global Partnership on Forest and Landscape Restoration (GPFLR)[38]. These global knowledge brokers are key players, but they are not suitable for local level approaches since they lack a mandate and the capacity for local implementation (Wentink, 2015). Technical support is also provided at the global level by actors such as the WRI, IUCN, UNEP and FAO.

[37] This partnership focuses on agricultural productivity, food security and livelihoods but of its structure, with more than 60 partners from public and private sectors, NGOs and development corporations, provides an investment framework which is accessible to many more partners than without the PPP (FAO & Global Mechanism of the UNCCD, 2015).
[38] The GPFLR is voluntary, supports knowledge sharing, creates momentum, works at the global level, communicates success stories, builds political support and provides meta level partnership building

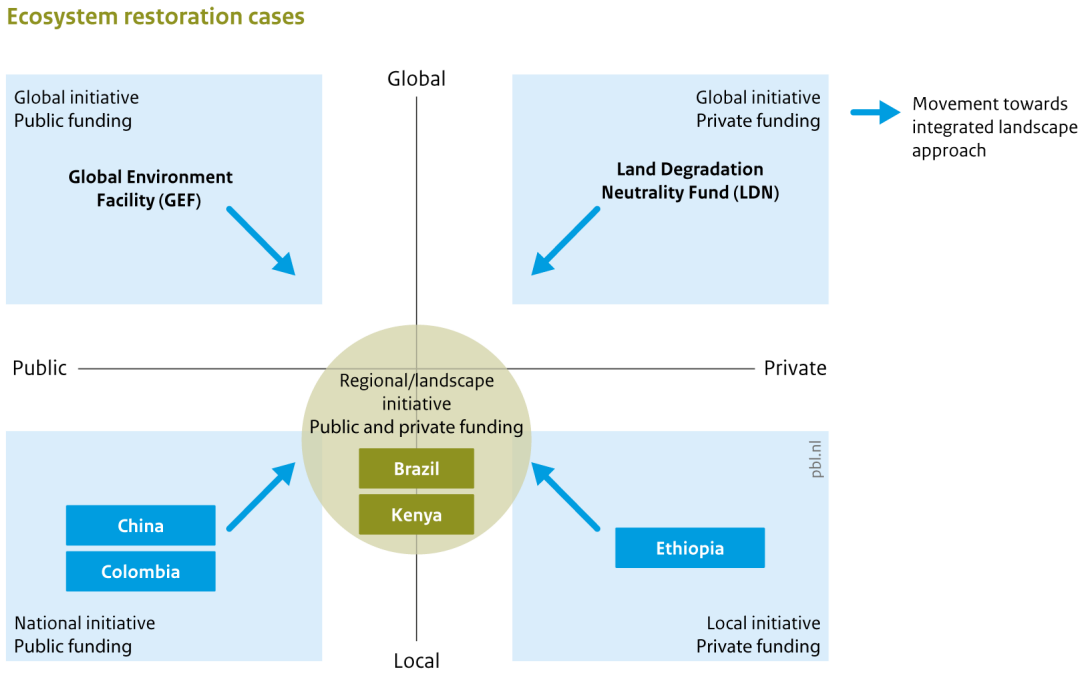
Investment funds can be used to pool various local and global sources of financing, both public or private, for projects at regional/landscape levels. They can also aggregate projects which are too big for microfinancing and too small for institutional investors, in order to deliver a deal pipeline that is sufficiently interesting for large scale private sector funding. Investment funds can play brokering roles in terms of linking projects to financing, and sharing knowledge of lessons learned. PES schemes are also financing instruments, which can help to coordinate funding for local ESR activities. However, this requires an enabling environment with clear safeguards. Restoration efforts can be replicated in series of projects which are grouped according to type of activity or type of financial risk (Credit Suisse & McKinsey Center for Business and Environment, 2016). Investment funds can also help to pool funds from various sectors operating under umbrella topics such as biodiversity and climate.

Summary

- Institutions and organisations, particularly PPP platforms and investment funds, can help to link public and private financing to interests at all levels and promote the implementation of financing for ESR.
- The number of institutions and organisations addressing coordination issues is increasing, though there are still too few, particularly at the local and regional levels.
- The key coordination issues include the prioritisation of ESR sites, the use of local knowledge, adequate monitoring and enforcement, and capacity building for the coordination of projects and financing.

3. Illustrations

This section highlights examples of financing and coordination in ESR in practice, taking stock from existing cases with sufficient information on both issues, in order to explore strengths and weaknesses in their approaches. While there are many other restoration projects around the planet (see Appendix) most do not provide sufficient data, or they focus on a single return or benefit. We attempted to study a diverse set of projects from all four elements of the matrix in Figure 10, it is important to note that large-scale private financing is mostly absent or in development (LDN Fund), and that at present, most cases fall in the public-local frame (China, Colombia). However, funding is also arriving from the public-global frame (GEF), with a general trend towards private sector inclusion at the regional level, where there is a mix of restoration and rehabilitation projects to suit different interests (Brazil, Kenya). Our selection of cases comprises China's Loess Plateau (Figure 11), Colombia's watershed restoration, Ethiopia's Tigray region, Brazil's Atlantic Forest Restoration, and Kenya's Lake Naivasha basin.



Source: PBL

Figure 10: Diagram of the cases examined in this section. The arrows represent the trends towards regional and landscape approaches with public and private financing combined

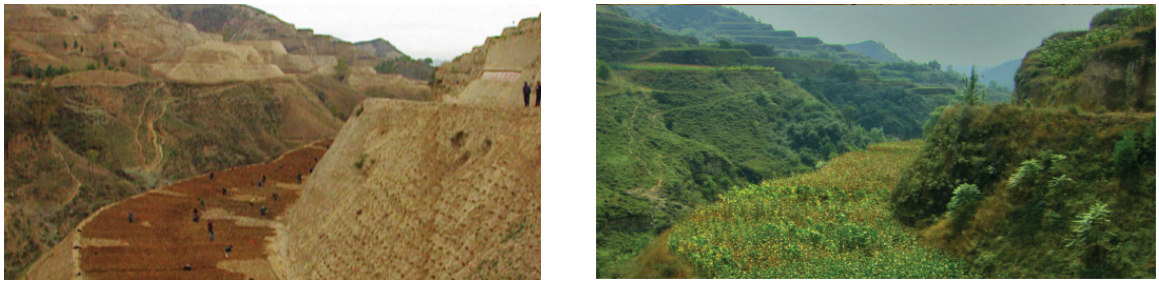


Figure 11: Example of ESR in practice: restoration of the Loess Plateau in China. Photos © Environmental Education Media Project (EEMP). All rights reserved.

3.1. China: Loess Plateau

Scale of restoration	Over 1 million ha of the total 64 million ha of the Loess Plateau.
Initiator	National level – Chinese Government
Finance source	Public (domestic and international)
Biome	Grassland, forest, cropland
Instruments & mechanisms	Enabling instruments (government regulations, subsidies), Asset instruments (PES scheme for cropland conversion) Coordination mechanisms (PES scheme)
Restoration type	Wide-scale restoration and reclamation of degraded croplands through conversion to forest, shrub and grassland, including apricot and walnut trees with economic value.
Restoration Goal	Decreased erosion and increased agricultural productivity. Part of the national goal to convert 14.67 million ha of cropland to forest by 2010, which would result in a 10-20% increase in national forest area and a 10% decrease in croplands (Bennett, 2008).
Trade-offs	Issues with the level of support for the PES scheme and a lack of local representation and knowledge in decision making may limit the long-term success of the project in some areas. There is a trade-off between the scale of restoration and biodiversity, given the introduction of non-native species.
Impact	The ecological impacts of restoration on the Loess Plateau are generally positive. The land area with perennial vegetation increased from 17 to 34% by 2007, bringing about increased carbon sequestration through soils and vegetation (Lu, et al., 2012). Sediments in water declined by 99% between 1998 and 2007, indicating radically decreased erosion rates and downstream flood risks (Tang, Bennett, Xu, & Li, 2013). Terracing increased average yields and lowered yield variability: between 1999 and 2005, the yearly per capita grain output increased from 365 kg to 591kg (World Bank, 2007).

The case of China's Loess Plateau Watershed Restoration Project, part of the national Grain for Green program[39] launched in the 1990s, is used worldwide as a sterling example of large-scale restoration. Initiated and primarily funded by the Chinese government, with the World Bank also providing capital, China was able to push for wide-scale action with a particular focus on sloping lands[40] in response to spiralling problems with soil erosion, sediment flow, sandstorms and water provision. The programme incorporated one of the largest and most ambitious PES schemes in the world, directly engaging rural households and supported by grain subsidies and input finance for seeds and restoration activities. In cases such as the Loess Plateau, restoration can be classed as successful, a result of the low opportunity costs associated with degraded and sloping lands, and adequate public financing. However, some challenges remain, particularly with regard to local stakeholder involvement and the role it plays in the success of ESR projects. Furthermore, it is difficult to replicate the Chinese success story, as many countries lack their strong top-down political support and great availability of public financing and enabling instruments.

Financing issues

Given the mass mobilisation of resources and the sheer scale of the restoration efforts, average investment costs were low at 143 USD/ha (Ferwerda, 2015). Start-up costs for

[39] Also called the Sloping Land Conversion Program or Grain for Gold
[40] Given that 4.4 million ha of the land is on slopes greater than 25% (Bennett, 2008)

landowners were supplemented by PES schemes and subsidies for seed inputs, and the opportunity costs of restoration were decreased by government regulations adopted in a 1999 ruling which banned tree felling, grazing and growing crops on slopes, thereby allowing perennial vegetation coverage to increase from 17 to 34% in a decade (World Bank, 2007). Further government policies offered local people the opportunity to purchase low-cost land leases for restoration and the subsequent land rights for any PES applicable to that land (World Bank, 2007).

However, investment returns varied among stakeholders. Downstream stakeholders benefitted greatly from the upstream restoration efforts as sediment flow in the Yellow River was reduced by more than 53 million tons in 10 years, and local stakeholders benefitted through increased income, improved local food supply, and decreased poverty (Ferwerda, 2015). However, there were also cases where the cost recovery for local investments in restoration took longer than the period subsidies were available. For example, subsidies were offered for grasslands for a two-year period and for tree planting during eight years, but the growth time of the walnut trees which were planted as an alternative source of income is much longer than that (Yin & Zhao, 2012). In addition, while the PES program has been extended, payments and subsidies have almost been halved, due to the lack of government funds and other budget priorities. In areas with higher opportunity costs, the risk and uncertainty as to returns is likely to affect the long-term success of ESR projects. One survey highlighted that 56% of the farmers in this region would return to grain farming once subsidies stop in 2018 (Chen, Wei, Fu, & Lu, 2007) (Jiao, Zhang, Bai, Jia, & Wand, 2012) particularly those in regions with less successful restoration results, inadequate compensation or lack of development of alternative livelihoods (Cao, Chen, & Zhu, 2010).

Coordination issues

Most of the reductions in government funding in recent years have been due to the lack of allocated budget for the coordination of restoration activities. The mandate for restoration activities, along with the tasks of targeting and prioritisation, was given to municipalities in the region, who had neither the funds, nor the administrative capacity, knowledge, technical capacity or supporting institutions to undertake the effort (Bennett, 2008) (Yin & Zhao, 2012). As a result, search and information costs were high at the local level, and, while mass mobilisation can be efficient, it is not suited to all areas, and here this resulted in high costs when non-native species were planted in places where they could not deliver the required returns, namely erosion control and avoiding run-off (Li, et al., 2010). While there is some support from the state forestry administration, they favour the reforestation approach on a scale as wide as possible in the chosen watersheds.

In addition, the top-down nature of these restoration efforts meant that organisation and representation costs were high. The lack of adequate organisation and representation at the local level resulted in limited local stakeholder involvement and failure to understand the biophysical and socio-economic linkages of restoration, which in turn caused actions to be dependent on financial incentives. As we have seen in Section 2, intrinsic bottom-up

motivation is a key condition for the longevity of a restoration programme, with financial incentives working to prolong action, not initiate it. As many of the interests downstream are prioritised – such as reduced sedimentation and water availability – these ecosystem services could be used to the advantage of creating available funding for upstream restoration efforts through water user fees (Hiller, 2012). In Shaanxi Province, researchers found that more than 85% of local people had different priorities than the government regarding agriculture and livelihood development (Cao, Zhong, Yue, Zeng, & Seng, 2009).

Insufficient organisation, capacity, funds and local stakeholder empowerment have resulted in inadequate progress monitoring and failure to enforce compliance (Yin & Zhao, 2012) (Bennett, 2008), Altogether, this adds to the likelihood that much land will return to cropland once the subsidy period ends. Lessons learned are also limited given the scarce follow-up of Grain for Green projects (Yin, Liu, Yao, & Zhao, 2013). To scale up these efforts and ensure long-term success, improvements must be made to local community input, technical support and capacity building for municipalities through local institutions, while the targets for ecosystem services need to be specified (Bennett, 2008).

Summary

- Mass mobilisation of finance and political support at the national level makes for reduced financing issues.
- However, the long-term success of a project is often subject to adequate coordination by public and private bodies, focussing on targeting and the prioritisation of suitable ESR sites, organisation of financing and projects by local stakeholders, progress monitoring and the enforcement of deliverables.
- Institutions to support the coordination between national and local levels are missing.
- Failure to develop sources of sustainable financing from downstream beneficiaries reduces the survival rate of ESR projects beyond the "public finance exit".
- The implementation of certain policies and enforcement measures, such as the grazing laws, have been effective in reducing opportunity costs for restoration.

3.2. Colombia

Scale of restoration	Total of 87,870 ha restored.
Initiator	National level (Colombian Government)
Finance source	Public (fiscal) Private (offsets)
Biome	Tropical and subtropical forest
Instruments & Mechanisms	Enabling instruments (regulations, grants)
Restoration type	Restoration of primarily small-scale watersheds
Restoration goal	Watershed functions; erosion control; biodiversity recovery and the eradication of exotic species; increase in ecosystem areas and their connectivity to the landscape. Pledge to restore 300,000 ha of degraded ecosystems by 2018 and 1 million ha by 2020.
Trade-offs	Successful watershed restoration yet limited impact due to lack of prioritisation of efforts, and lack of local stakeholder inclusion.
Impacts	Biodiversity recovery and erosion control, lack of quantification.

ESR efforts have been undertaken in Colombia since the 1950s, following a government policy to establish areas for reforestation and the allocation of funds for the purchase of land and planting of trees (Murcia, et al., 2015). The current restoration policy, which was formulated in 2012, allows for offsetting biodiversity losses deriving from infrastructure or resource activities and is supported by the political pledge to restore 300,000 ha of degraded ecosystems by 2018 and 1 million ha by 2020 under the Initiative 20x20 (World Resources Institute, 2016). Projects cover 87,870 ha located primarily in the Andes mountains (Murcia, et al., 2015), as a result of the preference to protect watershed services and the prevalence of publically owned land above the agricultural belt (Cuba, 2014). What is important to note is that the projects are predominately small-scale (less than 1,000 ha) with just three whose area is larger than 10,000 ha. In line with national and international goals, Colombia is keen to scale up existing or planned restoration efforts, though the country faces a number of challenges.

Financing issues

Start-up costs are covered by the Colombian government, who has initiated and financed 78% of the projects, and financed 50% percent of privately initiated projects. Additional funds come from the private sector through the restoration law which requires infrastructure and resource extraction companies to offset environmental damage, and more recently through the GEF, with regard to biodiversity conservation and sustainable land management. With 89% of the projects focussing on water delivery at the watershed level, investment returns are based primarily on ecological returns, while socio-economic and cultural returns are present in only 22% of the projects. This singular focus and lack of inclusion and consideration for returns benefitting the local stakeholder results in a situation where local communities do not wholeheartedly adopt ESR or see the benefits, which could limit the

long-term economic sustainability of restoration efforts (Casey, 2015). Given that top-down government financed projects are located in areas above the agricultural belt with low opportunity costs, the risk of investment is low (Murcia, et al., 2015).

Coordination issues

Similar to the Loess Plateau case, the nationally initiated and financed restoration activities in Colombia face coordination issues which are more important than finance questions. However, government budgets remain tight. Given the recently introduced policy and legal framework in Colombia to develop nationwide ESR projects in line with global biodiversity and land degradation neutrality targets, there is an urgent need to prioritise finite resources. In Colombia, where current priorities are limited to watershed areas which lie above agricultural production zones and have high population densities, there is a need to prioritise wider ecosystems (mangroves, lowland forests and wetlands). Search and information costs are expected to be high and therefore determine several requirements and criteria for selecting projects with the highest expected benefits. (Casey, 2015). Humboldt University is in the process of addressing this matter by developing maps which take into account biophysical and socio-economic data. Prioritisation will help to ensure optimal financial resource allocation at the national level (Murcia, et al., 2015).

Organisation and representation is also an issue in Colombia, given that communities are marginalised from decision making processes and project design (Murcia, et al., 2015). In addition, monitoring and enforcement add to coordination costs: while all projects have monitoring plans, 90% assess short-term goals only, using performance indicators and benchmarks that are often unclear. There is a need to link bottom-up with top-down approaches, to monitor ESR projects on the ground and through satellites in order to demonstrate successes, and help leverage further funding. This requires applying biophysical and socio-economic variables in project assessments and sharing lessons learned.

Summary

- Coordination is made difficult by lack of local stakeholder inclusion, and top-down approaches limit the availability of funding from the private sector, which can help to scale up practices in areas within the agricultural belt, which have higher opportunity costs.
- Colombia appears to have sufficient funding at present, though top-down approaches restrict broader societal participation and opportunities to link public and private stakeholders and local bottom-up knowledge with national goals.
- The way to scale up this approach is through bottom-up initiatives supported by strong policy frameworks and national-level planning, and PPPs to ensure the inclusion of all stakeholder interests.
- Governments should remain involved as they have the authority to acquire and allocate significant economic resources (such as PES and bilateral funds), they own strategically located land, and they have the capacity to convene and coordinate large-scale projects.

- Governments should therefore lead the ESR agenda, collaborate regionally and internationally, actively promote a new generation of socially inclusive restoration models that engage local stakeholders and incorporate monitoring and integrate ESR into their development strategies (Murcia, et al., 2015).

"To scale up, restoration needs to be sustainable, it needs to be measured from space and from the ground, it needs to be inclusive and properly planned"

- Manuel Guariguata (CIFOR) (Casey, 2015)

3.3. Ethiopia: Tigray Region

Scale of restoration	960,000 ha of active restoration and rehabilitation of cropland and 1.2 million ha of natural restoration in the Tigray Region with a total surface area of 4.1 million ha.
Initiator	Local level; later taken up by Ethiopian National Government
Finance source	Private (local, in kind) Public (ODA, fiscal)
Biome	Ethiopian highlands including croplands, grasslands, forest, bushland
Instruments & Mechanisms	Enabling (intrinsic motivation through environmental disaster, political support) Asset (grants, concessional loans)
Restoration type	Primarily passive restoration (conservation) and active restoration (reforestation) and rehabilitation (terracing).
Restoration goal	Erosion control, soil fertility, increased water availability in highly degraded areas; in a later stage also watershed restoration.
Trade-offs	Strong, community-based projects provide good social and economic returns, which could be jeopardised if scaled up and different returns are prioritised.
Impacts	Soil loss by erosion reduced by 68% of 1975 rate, improved vegetation cover, infiltration rates, crop yields and groundwater recharge (Rinaudo, 2010). Lack of quantification of impacts.

Ethiopia's Tigray region faced environmental disaster in the recent past, losing nearly 97% of its forests and 1 million people due to the resulting '84-'85 famine (Minnick, Woldemariam, Reij, Stolle, Landsberg, & Anderson, 2014). Over 10 years, villagers in Tigray contributed over 40 days of work per year to actively restore the land through replanting, terracing and facilitating natural regeneration (Brasser & Ferwerda, 2015). As a result, in addition to drought resistance[41], food production increased, ground water levels recovered and incomes rose. In 2002 the Government of Ethiopia and the World Food Programme began a systematic approach to restore watersheds in other regions, and they are now supported by the 15 million ha restoration goal of the Bonn Challenge and the African Restoration Initiative (AFR100[42]) (WRI, 2015).

[41] Even so, externalities such as climate change and extreme El Nino years such as 2015 have left restored areas impacted by drought (Aljazeera, 2015).
[42] AFR100 is a country-led effort to restore 100 million ha of land in Africa by 2030. The initiative was launched at the COP21 in Paris 2015 and is already supporting commitments to deal with 31 million ha.

Financing issues

The small-scale nature of restoration in Ethiopia, in addition to the low opportunity costs of degraded land and government policies ensuring clear land rights and food aid in exchange for 20-40 days per year of compulsory restoration work (Denier, Scherr, Shames, Chatterton, Hovani, & Stam, 2015), meant that investment costs were low, and there were clear social and economic returns (Dodd, 2015). Since 2002, 125,000 people have directly benefitted and crop production has increased by 400%, thereby reducing the proportion of households depending on food aid from 90% to 10% (Denier, Scherr, Shames, Chatterton, Hovani, & Stam, 2015). However, in order to reach restoration targets and deal with increasingly severe droughts, additional funding and capacity building is required. It is likely that funding will remain primarily public given the high risks and uncertainty of restoration efforts in areas with low drought tolerance, but since 2008 additional finance and technical assistance has come from the World Bank, IFAD, EU, CIDA, KfW and GIZ (World Bank & TerrAfrica, 2015).

Coordination issues

The scaling up of ESR projects requires a coordinated effort, as bottom-up approaches are limited in their effectiveness due to the high cost of organisational and technical knowledge. However, search and information costs with regard to prioritisation are reduced due to the presence of local knowledge, and by the intrinsic motivation for restoration in order to increase food security and incomes, and minimise the impact of future droughts.

Summary

- While projects in Ethiopia produce good results at their current scale, meeting international goals requires scaling up activities, which may result in increased financing and coordination issues.
- However, these strong, community-based projects could serve as the basis for efforts to scale up, but this requires strict government regulations and public funding to ensure the delivery of public goods, guarantee local stakeholder representation and leverage funding by the private sector, through, for example, PES schemes.

3.4. Brazil: Atlantic Forest Restoration (PACT)

***Scale* of restoration**	Current restoration area under PACT is 60,000 ha, while the definitive goal is to restore 15 million ha of the total Atlantic Forest area of 132 million ha.
Initiator	Regional level: multiple stakeholders
Finance source	Public (ODA, DFIs, fiscal sources) Private, including landholders, mining companies (VALE), pulp companies (Fibria) and offset schemes from the Brazil Olympics projects
Biome	Tropical forest, cropland - fragmented (mosaic)
Instruments & Mechanisms	**Enabling**: government regulation and fiscal incentives (forestry code, access to rural credit) **Asset**: PES scheme, water user fees, compensation payments, grants and microloans **Coordination**: PACT multi-stakeholder platform, regional funds[43]
Restoration type	Mosaic restoration including reforestation of degraded lands, reconnecting isolated forest fragments, re-establishing forests and rehabilitation to promote sustainable harvesting of timber and non-timber products.
Restoration goal	Forest restoration, biodiversity protection, hydrological services, agro-forestry.
Trade-offs	Potential for trade-offs between downstream beneficiaries and local interests.
Impacts	It is expected that the final goal of 15 million ha will give the area the capacity to remove 200 million tonnes of CO2 per year, and store 2 billion tonnes of CO2 by 2050 (Calmon, et al., 2011). Lack of data on ecological impacts.

The Atlantic Forest in Brazil is one of the highest priority regions for restoration globally (Calmon, 2015). This biome provides ecosystem services such as drinking water to more than 60% of Brazil's population (who provide more than 80% of Brazil's GDP), yet more than 88% of the original forest has disappeared, largely due to land clearing, logging and agriculture (Pinto et al., 2014). The Atlantic Forest Restoration Pact (PACT), initiated in 2009, is a regional multi-stakeholder platform formed by NGOs, research institutions, private sector actors and government agencies to align and coordinate efforts and objectives for restoration[44] and link key stakeholders, including seedling producers and knowledge sharing institutions, to implementation practices and inputs. The PACT currently consists of more than 270 stakeholders from the level of the individual farmer to international NGOs, all working together to facilitate and implement restoration projects across 17 Brazilian states (Kissinger, 2014). The PACT manages both public funds allocated by government budgets and ODA and private funds obtained through PES, offset schemes for Brazilian infrastructure mitigation, water user fees, compensation payments for restoration and grants and microloans for establishing alternative sources of income.

[43] Offsetting and impact mitigation from infrastructure projects, grants and microloans (BNDES, Plant a billion trees (TNC)), Funds, including AFcoF II, the critical ecosystem partnership fund (CEPF), Action Fund

[44] This includes restoring 15 million ha of degraded and low productivity lands by 2050, of which 1 million ha are a contribution to the Bonn Challenge with the aim to deliver better water supply for users downstream, provide flood control, watershed protection and reforestation, obtain green certification and establish alternative livelihoods through non-timber forest products (Kissinger, 2014)

Financing issues

Restoration costs are high for the Atlantic Forest, given the mosaic nature of the landscape and the needs of multiple stakeholders. In comparison to other cases, such as China or Costa Rica, where top-down efforts have been the dominant method of implementation, Brazil generally favours a more regional, bottom-up approach, though combined with strong political support and strict regulations, such as the Forest Code, which includes mandatory restoration. To reduce start-up costs, investments are used to set up an enabling environment through capacity building[45] and to implement market mechanisms for financing. This generates bottom-up motivation for local landowners, resulting in the landowners' greater willingness to cover a larger proportion of the implementation costs. In exchange for compliance, the landowner is offered lower insurance premiums, compensation payments and microfinance grants and loans.

Investment returns and cost recovery issues are a minor problem given the support of the regional and national governments in helping to deliver non-monetary social returns[46], presence of various financial return mechanisms, and a long term approach supported by intrinsic motivation at the local level. However, PES schemes maintain a delicate balance, considering the high opportunity costs of land use in Brazil, and should be employed to maintain restoration activities, not initiate them. Funding should help incentivise legal compliance (Kissinger, 2014). Private sector investments are leveraged through the use of marketable goods. Certification, offsetting and PES schemes also contribute but are only possible if supported by government policy (Brancalion, Viani, Calmon, Carrascosa, & Rodrigues, 2013). They help to reduce the risk and uncertainty of investments to attract and involve other private sector actors, such as the VALE mining company, and Fibria, a pulp company which invests in seedlings and technical assistance and has put up 70 million USD to restore 21,000 ha by 2025 (Kissinger, 2014). The financing obtained from private and public sources is directed towards various funds run by BNDES. PACT acts as a safeguard for investments, and political support and regulation help to reduce risks.

Coordination issues

Coordination issues have been addressed more effectively than in many other projects currently ongoing. Search and information costs have been reduced greatly by mapping and targeting those areas with the highest trade-offs between ecosystem services and greatest ecological and socio-economic importance, and awarding them prioritised investments. This is why present efforts are focused on creating a strong enabling environment and incentivising actors to adopt restoration activities in the most strategic areas (Denier, Scherr, Shames, Chatterton, Hovani, & Stam, 2015). These projects are then recorded in a public registry. This project is aided by a strong enabling regulatory environment with clear tenure rights, in a region where 90% of land is privately owned, and a strong knowledge sharing multi-stakeholder network exists. However, finding appropriate and bankable projects still

[45] Building seedling nurseries and providing extension services
[46] in Espirito Santo state, returns have included improved water supply, lower water treatment costs and reduced flooding and erosion (Shames, Hill Clarvis, & Kissinger, 2014)

takes time, with PES schemes difficult to run across state borders due to differing regulations.

Management of monitoring and enforcement costs has been made simple by funnelling financing into appropriate regional funds[47] which not only act as safeguards ensuring the delivery of public and private goods, but also enforce compliance with the Forest Code. The PPP structure helps to aggregate projects and link them to funding that they would otherwise not have access to, particularly from international sources (Kissinger, 2014). The PACT performs very well in the field of mapping and monitoring tools. Developed by more than 50 partner institutions, they are widely available and combine over 87 indicators that cover biological, economic, social, legal, environmental and management data. However, PACT does face issues regarding knowledge dissemination, training and capacity building, though the development of a new web-based register and monitoring system aims to resolve this and promote ways to compare projects and share lessons learned between them (Bustamante & Kirgizbekova, 2015) (Pinto, et al., 2014).

Regarding organisation and representation, local groups, though vital for bottom-up project implementation, are still somewhat underrepresented. Furthermore, while there are funds and financial transactions, there is need for effective financial orchestrator. BNDES, the organisation that oversees the various funds for Atlantic Forest projects doesn't have the mandate to integrate financing options, which would further decrease transaction costs, aid cooperation and limit trade-offs between agricultural and forestry sectors. PES schemes help to organise the buyers and sellers of ecosystem services. As for the financing of the organisation itself, all positions, except the Executive Secretariat, are voluntary are voluntary, which means that working hours of the participants are paid in kind by the institutions and organisations they represent (Pinto, et al., 2014).

Summary

- The mosaic nature of many degraded landscapes clearly lends itself to a public-private approach which provides access to more options for financing but also requires that sufficient returns are generated. Prioritising areas is therefore a key issue. The PACT case appears to demonstrate the effectiveness of relying on market-based incentives for mosaic landscapes where various returns can be monetised, pooled and sustained as long as the returns are delivered.
- Translating national goals into project implementation at the local level is made easier through the use of funds and PPPs at the regional and landscape levels, and through support from existing institutions to coordinate finance and knowledge.
- With increasing numbers of stakeholders, come increasing organisational and enforcement costs, and this is where capacity is required. Diversifying regional funding sources, aggregating and sharing knowledge, providing political support and regulations for top-down actions and applying an approach for the development of

[47] AFcoF II, critical ecosystem partnership fund (CEPF), Action Fund

bottom-up intrinsic value are all measures which contribute greatly to resolving financial and coordination issues. Nevertheless, some coordination issues remain regarding organisation, representation and financial management. The development and sharing of success stories is crucial to building momentum for investments in ESR.

3.5. Kenya: Lake Naivasha

Scale of restoration	Restoration area covers 340,000 ha. Targets for Kenya include 4.1 million ha for reclamation (reforestation) and 10,000 ha for restoration (silviculture)
Initiator	Kenyan Government & Prince Charles' International Sustainability Unit (PC ISU),
Finance source	Public (government of Kenya, CIDA, GIZ, DfID, Kenyan Embassy in the Netherlands, NGOs – WWF, SNV) Private (UK retailers, ASDA, Tesco, Marks and Spencer, Sainsburys, German supermarket REWE and Swiss-Coop, Equity bank Kenya)
Biome	Forest, cropland, watershed.
Instruments & Mechanisms	Enabling (capacity, technical assistance, knowledge sharing on water resources management, access to credit and low interest loans) Asset (PES, water user fees) Coordination (Imarisha Naivasha Board (PPP) and upcoming Lake Naivasha Sustainable Development Fund)
Restoration type	Restoration of upstream land, reforestation, ecological restoration
Restoration goal	Ecological resilience of Lake Naivasha basin, hydrological services
Trade-offs	Between sector goals, private goals and local upstream stakeholder interests.
Impacts	Increasing water provisioning from upstream PES. Lack of data on impacts.

The Lake Naivasha water catchment in Kenya covers an area of 340,000 ha, including the Aberdare ranges and Mau Forest, and is home to a multitude of industries and sectors including cut flowers, and upstream Small and Medium sized farms. The dramatic population increase between 1960 and 2000, in combination with increasing land use, water use, deforestation and the severe 2009 drought, led to greater awareness of the shared risks between stakeholders. The Kenyan government spearheaded efforts to set up a programme to address the issues and appointed a PPP board to coordinate initiatives and financing, and monitor and enforce compliance. The programme consists of PES schemes and water user fees, but faces major challenges in its efforts to upscale restoration practices, given the size of the water catchment area and the presence of up to 250,000 smallholders upstream, and because it lacks appropriate mechanisms to enforce the payment of fees across sectors (Kissinger, 2014).

Financing issues

Though coordination is carried out effectively, a financial gap exists for the necessary scaling up of activities. Despite intense private sector involvement, most funding is still public. There

is, however, a move towards the climate finance system, which is essentially a mechanism to pool funding and interests. The move will eventually result in an overarching approach covering many sectors which can help to identify priority risks and opportunities. The aim is to pool projects to gain access to significant new sources of finance which can provide the additional funding required to address the needs of 250,000 smallholder farmers in the upper catchment area. Enabling regulation is required to lower the opportunity costs of inter-sector cooperation and address efforts made by the landscape approach (Kissinger, 2014).

Coordination issues

Coordination and knowledge sharing are both effective, thanks to the success of the PPP in involving the public and private sectors, and developing a PES scheme. In addition, the Lake Naivasha board has set up a multi-sectoral project monitoring committee, thereby increasing capacity. There is, however, a need for partnerships to move beyond their own sectors, and develop and share research and technical capacity. Strong political support, which is currently lacking, is needed to keep up momentum and maintain the strong leadership role and enforcement mechanisms of PES schemes. With the potential increases in financial sources in mind, there is a need for a financial orchestrator, such as an investment fund, to pool funding, prioritise investments and develop a track record to leverage private finance. This idea is being developed in the form of the Lake Naivasha Basin PPP Sustainable Development Fund.

Summary

- The financing issues of the Lake Naivasha watershed are complex due to the varied returns for different stakeholders and its sector-based financing.
- Where opportunity costs are low, financing plays a smaller role. However the financial orchestration is a key obstacle, particularly when aiming to scale up to the basin or the watershed level, and when enforcement is limited.
- Most funding is public, despite the PPP's huge importance for the private sector and the flower industries. There needs to be better orchestration and organisation of finance to enable pooling from different sectors and allow for prioritisation of projects.
- There is a growing trend towards a more landscape and region-based approach, which means tensions between the public and private sectors will become more prominent and global ambitions and financing will be linked to projects on the ground.
- Tensions between public and private sectors must therefore be addressed to access available funding, and more coordination is needed to address trade-offs and conflicts between sectors.
- Private investment has three entry points: biodiversity and conservation, production and economic development (livelihoods).

3.6. Overview of strengths and weaknesses

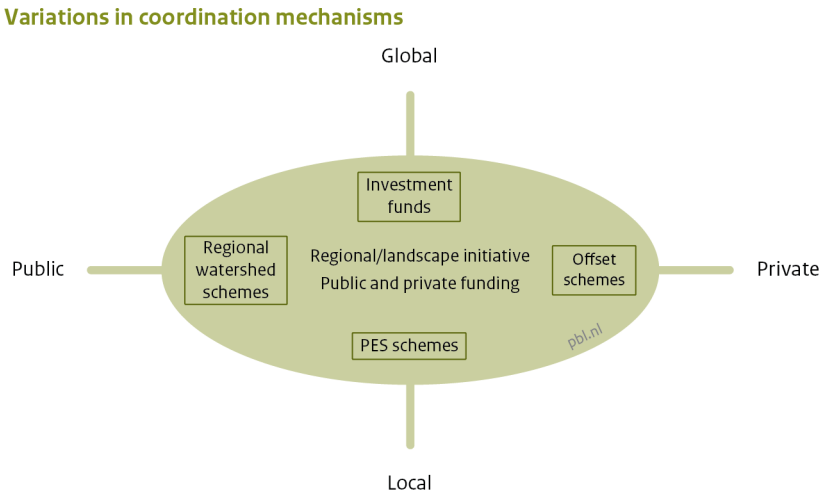
The cases described above serve to highlight a number of strengths and weaknesses in addressing the financing and coordination challenges that restoration projects face. Observed strengths in the approaches include:

- A strong enabling environment. Clear political commitment and on-the-ground support appear to be key ingredients for the mobilisation of finance for wide-scale restoration efforts, and regulation helps to reduce initial costs and increase local stakeholder participation by establishing clear land rights and reducing opportunity costs.

- Private financing is the key to helping to alleviate the limitations of public funding, given the scale of the restoration challenge. This can be seen in the tendency to move away from national and local ecological restoration initiatives (China, Colombia, Ethiopia) towards regional, mosaic and landscape focused efforts (Kenya, Brazil). In addition to the long time scales of restoration, limited and variable public budgets require additional financing capacity that can be delivered by the private sector. For example, in China, additional funds for PES could come from payments by downstream water users, or taxes on goods not directly linked to ecosystem services other goods. There remains a need for public financing for ESR to ensure public and non-monetary returns in the long term, particularly in high risk areas such as Ethiopia.

- The regional level approach involves a diversification of cost recovery instruments that can help to align public and private interests. There is no 'silver bullet' — what is needed is an array of measures that can be combined to achieve different project goals, address risks and tensions and secure returns. For example, in Brazil a combination of PES, certification, offsetting and mandatory restoration regulation is used to leverage private finance. Public stakeholders must create an enabling environment where these mechanisms are endorsed and mobilised through regulation and the law.

- The number of mechanisms for coordination between public and private stakeholders at local and global levels is increasing (PPPs and investment funds) as a result of the multi-actor, multi-level nature of restoration. Local knowledge is increasingly used to prioritise and map restoration sites, and efforts are being made to pool funds from various sources at the regional level. Coordination mechanisms vary depending on the scale and the goals of a project (Figure 12).



Source: PBL.

Figure 12: Coordination does not necessarily have to be top-down. Various mechanisms exist to facilitate the coordination of diverse stakeholder interests and of projects operating at different scales."

- Addressing coordination issues can help to resolve financial questions: the cost of restoration projects can be greatly reduced by efficient organisation and institutional involvement, and by building on existing projects and intrinsic value. This means that part of the cost will be covered by the landowners themselves, local level understanding of the business case will help to reduce the risks of larger scale investments and effective monitoring and enforcement on the ground will help build up a good investment track record, as we have seen in the case study from Brazil.

However, several weaknesses have also been found:

- There is a lack of financial orchestration at the regional level**,** as the sectoral based approach in the Kenya case study revealed. While there may be private financing, trade-offs between interests can result in a fragmented approach. The Brazil case study also shows there is a need for a financial manager with the authority to integrate financing options from various sources to combine multiple interests.

- Scaling up can be hampered by a lack of adequate representation and organisational capacity at the local level. This is particularly clear in the China case study where lack of local inclusion may result in restored land reverting back to cropland once PES stops. Local stakeholder involvement can help to prioritise and monitor restoration areas, enforce continued action and provide local capacity, though the effects are still somewhat limited. Knowledge brokering at the regional level is beginning to take off via PPPs but still requires better representation of all stakeholders.

- Risk is still an issue, in terms of the high risk at initial project stages and leveraging adequate and sustainable private financing for the long term. The use of guarantees, investment funds, knowledge brokers and a bottom-up approach are ideas which are now being developed (Section 4) to build a solid investment track record to address the risk issue.

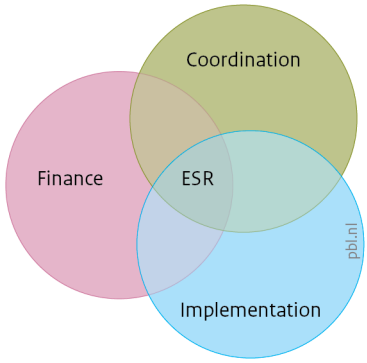
- Monitoring and enforcement are lacking in top-down approaches, which is often due to the fact that no clear goals for restoration have been set, indicators to measure success have not been defined and local-level involvement is limited. At the regional/landscape levels, this is improving somewhat, thanks to the development of specific monitoring committees, tools and investment funds to enforce adherence, but knowledge dissemination, training and the lack of local involvement and capacity building remain an issue. Quantitative evaluation of the impact of restoration on ecology, society and the economy is lacking. This was the objective of the Drylands & Forest and Landscape Restoration Monitoring Week organised by the FAO in Rome in April 2016.
- The implementation of standards and safeguards regarding local land user rights can be insufficient and difficult, as well as. The same applies to the implementation of the Voluntary Guidelines on the Responsible Governance Tenure of Land, Fisheries and Forests in the Context of National Food Security (VGGT) and to ensuring the principle of Free, Prior and Informed Consent (FPIC) is upheld.

4 Ways forward

4.1. Key lessons

Restoration efforts are increasingly moving towards regional/landscape based approaches in order to leverage private financing for scaling up ESR projects. To connect the local and global levels and create affinity between public and private actors, there is a need to pool resources, aggregate projects and structure the allocation of received funding to ensure the generation of returns on investment, through investment funds, PPPs, co-financing, and robust governance and institutions. It is clear that scaling up of ESR requires improvements in financing and, more importantly, in coordination (Figure 13).

The spheres of requirement for successful scaling up of ecosystem restoration



Source: PBL.

Figure 13: successful scaling up of ESR requires not only finance and implementation, but coordination of the two.

With an eye on the financing and coordination issues discussed in the previous sections, here we briefly discuss recent developments and identify areas where additional efforts are required to effectively upscale ESR investments.

- **Start-up and maintenance costs**
  Efforts are being focused on leveraging private finance through co-financing schemes (GEF, ISLA, Commonland), reducing uncertainties in costs by better brokering of knowledge and technical assistance (Moringa Fund, ISLA) and securing larger volumes of financing using instruments such as nature conservation notes (Althelia) and offsetting (Brazil AFRP). A new instrument which is currently being investigated is green restoration bonds (Unlocking Forest Finance).

- **Investment returns and cost recovery**
  Given that the existence of net social and economic benefits does not necessarily

imply there will also be financial returns, we are seeing an increase in mechanisms that help to value and monetise public good returns for private investors. These include PES, REDD+ and certification schemes (Biocarbon Fund, Althelia, Moringa Fund) which focus on activities such as public co-financing or risk guarantees for private investors, sometimes covered through public funds maintained through taxation in areas not connected to restoration[48]. Green financing has been receiving increasing attention in recent years, gaining even more momentum at COP21 in Paris, and there are very few reasons why ecological infrastructure projects cannot follow this new trend, particularly given the acceleration of the sustainable infrastructure bond market, the increasing risks of investing in carbon intensive sectors, and the growing support from green finance institutions and public capital, especially in less developed countries.

- **Risk and uncertainty**
  The use of risk/first loss guarantees and risk sharing structures is increasing (through organisations such as Althelia and Initiative 20x20) and new schemes are being developed (LDN Fund). However, the lack of an investment track record and small project sizes remain an issue for private investors. In response to this, new initiatives use existing funds to leverage additional funds, in a move from public investors to impact investors and, eventually, on to institutional investors.

A number of initiatives are attempting to reduce financial obstacles through better coordination of public and private interests from the local to the global level.

- **Search and information costs**
  The lack of local actor involvement in previous ESR efforts (China, Colombia), resulted in inadequate site targeting and prioritisation and, in some cases, diminished returns[49]. In current efforts we are seeing a development towards better inclusion of local stakeholders, increased knowledge brokering and improved mapping and modelling thanks to the use of local knowledge (Commonland, TerraBella Fund, ISLA). At the same time search and information costs are decreasing as a consequence of collaboration with NGOs and existing projects on the ground, where intrinsic motivation exists. However, knowledge brokering networks are required to pool knowledge from local and global levels and make it available at the regional level. The GPFLR initiative aims to do the same at the global level.

- **Organisation and representation**
  An increasing number of initiatives work towards local stakeholder inclusion and aligning public and private interests (EcoEnterprises Fund II, The Landscape Fund TLF) through coordination mechanisms such as PPPs, which support local capacity building by providing technical assistance and setting up an enabling environment for

[48] Such as Costa Rica's tax on diesel.
[49] Where lack of knowledge capacity resulted in failed restoration sites (see China case study)

local investments in ESR (Moringa Fund). Given the trend towards regional, landscape-based approaches, there is a critical shortage of institutions which can coordinate stakeholder interests and the relationships between local, regional and global levels.

Investment funds focussing on green solutions are on the rise, looking to create innovative private-public partnerships, pool resources and achieve maximum impact (Livelihoods Fund for Family Farming, Althelia). Compared to previous top-down approaches, recent developments focus heavily on local capacity-building and bottom-up approaches, particularly as building the local business case can help to establish a track record, and increase a project's longevity. Investment funds are also pooling funding at the global level and across sectors, particularly for renewable energy projects (Climate Investor One Fund[50]), and some, for example the recently developed international Green Climate Fund[51], are turning to restoration activities as well, grouping them under the climate umbrella. Various national and regional funds are also being established, such as the Amazon Fund, the FONAFIFA fund (Costa Rica) and the FONERWA fund (Rwanda).

Better organisation and in-depth knowledge can also advance the availability of public funding, because they provide national governments with tools and networks to effectively translate global goals into local implementation. Good examples are the Biodiversity Finance Initiative (BIOFIN)[52], which operates at the national level, the UNEP Financial Enquiry, with a more international focus, and national evaluations such as the UNCCD's Integrated Investment Frameworks (IIF). The growth in online sharing platforms, such as the Global Collaboration Engine (GLOBE)[53], is likely to further increase knowledge brokering. In addition, financiers, investors and NGOs are finding more and more opportunities to contact each other through platforms and conferences, such as the inclusive finance platform[54]. However, at the regional level knowledge brokering still falls short.

- **Monitoring and enforcement**
  Recent initiatives are focussing more closely on monitoring and enforcement through local stakeholder involvement and capacity-building. By developing local business cases that build intrinsic motivation, monitoring and enforcement costs on the ground can be reduced, particularly in the long term. Monitoring and enforcement are key areas for attention and still require further development, particularly to attract the private sector (LDN Fund), and much can be learned from the 87-

[50] various renewable energy projects in LDCs, via FMO, The Netherlands Development Finance Company (Climate Finance Lab, 2016).
[51] GCF aggregates various funding streams and knowledge under one fund, including supporting reduced emissions from forests and land use, while supporting increased resilience of ecosystem services (Green Climate Fund, 2015)
[52] BIOFIN takes a stepwise approach towards assessing National Biodiversity Strategies and Action Plans, in an attempt to fill national biodiversity finance gaps.
[53] See http://globe.umbc.edu/about-globe/
[54] See http://www.inclusivefinanceplatform.nl/home

indicator monitoring tool of Brazil's PACT initiative. In particular, data on the ecological and socio-economic impact of ESR projects is limited, but absolutely essential for evaluating the success of ESR projects. This issue can be addressed by setting stricter monitoring requirements.

A summary of recent initiatives can be found in the Appendix. While this list is not exhaustive, they represent the current trends in literature and at conferences.

4.2. Recommendations

The trend towards mosaic-based restoration approaches at the regional and landscape levels means more stakeholder interests and priorities need to be considered, which increases the complexity of coordinating projects and securing financing. In practice, coordination and financing are rarely addressed in full, though it should be noted that improved coordination can help to decrease the risks of financing and ensure long-term investments become feasible. To scale up investments in ESR and contribute to international policy goals, attention needs to be given to the following points:

- **Develop a strong enabling environment,** in terms of helping to leverage financing, and address risk and return issues for private investors. This requires
    - **Providing legal clarity** and addressing perverse incentives that drive land degradation. This can be achieved by reducing opportunity costs for restoration activities, demanding transparency in contracts drawn up between suppliers and beneficiaries of ESR and establishing unambiguous land rights and clear regulations for institutional investments. An example is the screening of contracts to establish their position on deforestation (the Equator Principles).
    - **Developing mechanisms** that address finance and coordination issues through national government regulation and law. This includes financial mechanisms to reduce risk, such as guarantees, and market mechanisms to reduce unexpected costs, such as restoration insurance.
    - **Developing and monitoring safeguards** for investments in ESR, based on the voluntary VGGT and FPIC guidelines, and drawing on lessons from REDD+ to ensure public good delivery and local representation and to address potential issues such as land grabbing.
    - **Using public financing to** leverage private financing and pay for the delivery of public and non-monetary returns from ESR. Public investments can help to push for a more cross-sectoral approach, embracing models for inclusive green growth in a variety of ecosystems, and incorporating the wider landscape approach into investment decision making. Public financing is especially relevant to reduce risk in the early stages of projects and for projects with many public benefits that are hard to market.

- **Create a strong track record** to reduce the risk of investments in ESR. This requires:
    - **Support for and development of institutions and organisations** that can broker projects and financing, coordinate priorities, pool funding, and demonstrate experience and consistent performance in ESR investments. These include investment funds and specialised branches of development banks. Investment funds are on the rise in other sectors, and are proving to be useful tools to fund bankable project pipelines and pool funding from various public and private sources for local and global projects. By operating with innovative mechanisms such as PES schemes and carbon credits, investment funds can help to aggregate smaller projects into bankable deals.
    - **Radically improved reporting** of ESR project progress at the local level, including better, consistent and standardised monitoring and mapping to show restoration progress and effectiveness and enable comparisons among projects.

- **Avoid reinventing the wheel.** Governments and organisations can learn how to handle financing and coordination risks from other sectors with a similar blend of public and private benefits, such as water and sanitation, agriculture, renewable energies and transport infrastructure. This can be achieved by:
    - **Increased knowledge sharing** between different sectors through events, seminars, exchange of experts and cooperation arrangements between organisations that invest in other high-risk sectors.
    - **Supporting and developing green finance schemes** for ecological infrastructure, similar to those used in other sectors, either through existing investment funds such as the Green Climate Fund, or through the establishment of national investment funds for ESR activities. These funds need to be readily available for upscaling investments in ESR, with support from national DFIs, which can orchestrate various national and regional funds.

- **Build knowledge brokering organisations and networks** to respond to the need for specialised organisations which can connect global and local expertise, aggregate technical expertise, record best practices, develop prioritisation methods, and broaden experience in project development by efficiently bringing stakeholders and investors to agreement. This requires:
    - **Strengthening existing knowledge brokering networks** at the global level such as the Global Partnership on Forest and Landscape Restoration (GPFLR).
    - **Supporting the development of regional and local PPP platforms and coordination institutes**. At present, there is a lack of institutions in which local land users, government actors, the private sector and knowledge institutes are represented, with the aim of promoting knowledge sharing, awareness raising and capacity building at regional and local levels. These platforms can help provide access to finance as part of their networking function. Coordination is required at the national and regional levels, though project evaluation is needed at the landscape and the local levels.

- **Advance standards for exploring the potential of ESR projects**, in order to reduce the perceived cost and risk of investment. This measure involves:
    - **Standardising assessments** according to a set of biophysical and socio-economic criteria, which will help to reduce risk and contribute to the development of an investment track record and ways to compare project characteristics.
    - **Better and consistent monitoring and mapping** to improve the provision of feedback on the quality of assessment criteria. There is insufficient insight into projects on the ground regarding financing and coordination, which stems from the context specificity of ESR initiatives and the lack of adequate and standardised monitoring and evaluation indicators, particularly at the beginning of project pipelines.

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Glossary

Blended Finance: The strategic use of development finance and philanthropic funds to mobilise private capital flows to emerging and frontier markets (World Economic Forum and OECD). Supporting mechanisms include Technical Assistance, Risk Underwriting and Market Incentives (OECD, WEF, 2015).

Debt: Money lent for repayment at a later date, usually with interest, at a market rate or a flexible rate (OECD, WEF, 2015).

Ecosystem restoration (ESR): Large-scale restoration of an ecosystem, covering both restoration (focus on natural functions) and rehabilitation (focus on production functions), in an effort to recover social and environmental returns.

Equity: Ownership in a company; value determined at time of investment (OECD, WEF, 2015).

Grant: A financial reward with no expected repayment or compensation over a fixed period of time (OECD, WEF, 2015)

Guarantees: Protection from various forms of risk intended against capital losses for investors (OECD, WEF, 2015)

Institutional investors: Institutional investors include banks, insurance companies, pension funds, hedge funds, investment advisors, endowment funds and mutual funds.

Investments: The allocation of capital to mechanisms, inputs, labour and capacity building that aid the process of ecosystem recovery with the expectation of scaling up efforts in terms of number and size of ESR projects, and generating ecosystem service returns

Liquidity: The ease with which an asset can be bought or sold in the market at a price close to its true value.

Land tenure: The relationship, whether legally or customarily defined, between people, as individuals or groups with respect to land and associated natural resources (water, trees, minerals, wildlife, etc.) (FAO, 2008).

Private investors: Here we define private investors as local farmers and businesses, private sector companies, impact investors and institutional investors such as banks and pension funds. Development Finance Institutions (DFIs) can be categorised between public aid institutions and private investors. Corporate Sector Responsibility departments of private companies can be involved in ESR projects through integrated landscape management and offset schemes.

Public investors: Government institutions whose main aim is to allocate capital to projects with the expectation of financial or other returns in the future. involves any government or state funds, including aid.

Scaling up: Expansion of an existing or planned project with regard to spatial scale, either by enlarging the physical area covered by the project or by aggregating several projects, i.e. within a landscape or region.

Smallholders / smallholder farmers: The definition of smallholders differs between countries and between agro-ecological zones. In favourable areas of SSA with high population densities, they often cultivate less than 1 ha of land, whereas they may cultivate 10 ha or more in semi-arid areas, or manage 10 head of livestock. Often, no sharp distinction between smallholders and other larger farms is necessary (FAO, 2008).

Acronyms

BCR – Benefit Cost Ratio

CSO – Civil Society Organisations

DFI – Development Finance Institution

ESR – Ecosystem Restoration

IRR – Internal Rate of Return

PES – Payment for Ecosystem Services

PPP – Public-Private Partnership

TEEB – The Economics of Ecosystems and Biodiversity

Sources

Key stakeholder interviews
Johnny Brom – IDH
Timothée Murillo – Livelihoods Fund
Walter Vergara – Initiative 20x20
Dieter van den Broeck – Living Lands/Commonland
Hans Schut – Commonland
Clement Chenost – Moringa Fund
Romano de Vivo – Syngenta
Karin van Boxtel – Both Ends

Conferences/events

- **Towards a land-degradation-neutral economy: business case and impact investment opportunities** (Keppler Cheuvreux, UNCCD, Global Mechanism, LDN Fund), Amsterdam, 15 September 2015
- **Economics of Land Degradation Event**, Brussels, 15 September 2015
- **Ministry of Foreign Affairs lunch meetings** – ISLA landscape approach, 24 September 2015
- **Global Landscapes Forum**, Paris, 5-6 December 2015

Appendix

Box 13 **Currently applied approaches and expected innovations**

Global Environment Facility (**GEF**)

GEF funding streams for land degradation, allocated 500 million USD to 100 projects between 2007 and 2013, which generated an additional 2 billion USD in co-financing. The GEF focuses on the importance of representation and rights at the local level (Bakarr, et al., 2014), but also helps to coordinate investments between and within sectors at the landscape level, such as those made through the SAGCOT initiative, and organises technical workshops on Decision Support for Scaling up and Mainstreaming Sustainable Land Management. Sectoral coordination is a key issue given the number of new developments in climate financing at local and international levels. GEF funding allows countries to receive funding for restoration projects, so that sector financing can be supplemented with climate financing.

World Bank BioCarbon Fund - Initiative for Sustainable Forest Landscapes (ISFL).
This fund, managed by the World Bank and publicly financed by Germany, Norway, the UK and the USA currently has USD 380 million available for investment. Working very closely with REDD+, it is dedicated to the formulation and implementation of climate friendly land use policies in regions where there is a high risk of agricultural expansion into forests. It offers payments according to emissions reductions, to incentivise positive performance in the context of climate change (Denier, Scherr, Shames, Chatterton, Hovani, & Stam, 2015)

FONERWA Rwanda
The Environment and Climate Change Fund (FONERWA) finances the implementation of the national Green Growth and Climate Resilience Strategy (2011), supervised by the Ministry of Natural Resources. FONWERA funds medium to large-scale projects and programmes run by the public and the private sector in the fields of agriculture, energy and forestry, including afforestation initiatives and ecosystem rehabilitation for climate resilience (FAO & Global Mechanism of the UNCCD, 2015).

Unlocking Forest Finance (UFF)
The UFF project, more a coordinating mechanism than a financing institute, was developed by the Global Canopy Programme and is funded by the International Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

The UFF project aims to "catalyse the creation of novel financial instruments", such as green bonds, operating at the subnational level of regions. It channels investments towards a range of activities, such as projects that counteract the pressure to clear forests, restore degraded land, promote more sustainable management systems, conserve forests and improve rural livelihoods. The UFF project uses a 4-step approach: 1) work with governments and local partners to increase awareness and identify combined objectives; 2) gather economic, environmental and social data to make a realistic estimate of costs and benefits; 3) model investments, the scale and distribution of potential returns and the environmental benefits; 4) use the cost-benefit estimate and the investment model as input for a feasibility study aimed at creating approaches to attract capital, such as green bonds and green development bonds. A preliminary study carried out for the Brazilian state Acre examined a series of initiatives which could reduce the loss of ecosystem service provision by 80%. The investment required was estimated at 900 million USD, which would be repaid over 30 years. The UFF project affirmed that the state government of Acre could support the initiatives by cooperating with fund management, participating in the fund as an equity investor and acting as an intermediary for an external bond issuer (Global Canopy Program, 2016).

Althelia Climate Fund
Althelia is an impact investor working in partnership with Credit Suisse to deliver "nature conservation notes", an impact investment tool used in sustainable agriculture and forest protection projects, bundling green bonds and carbon credits. Returns are generated through green bond interest, climate fund dividends, carbon credits and premiums for certified products, such as cocoa and coffee. USAID provides a 134 million USD risk sharing guarantee but their capital is sourced from public and private sector institutions, high-net-worth individuals and family offices (FAO & Global Mechanism of the UNCCD, 2015). Althelia focuses on large-scale mosaic restoration projects combining conservation and restoration, investing on average 10 million USD per project (FAO & Global Mechanism of the UNCCD, 2015).

Initiative 20x20
Initiative 20x20 was set up by the World Resources Institute and launched at the COP20 in December 2014, by Mexico, Guatemala, El Salvador, Costa Rica, Colombia, Ecuador, Peru and Chile, in support of the Bonn Challenge. The aim is to contribute to the restoration of 20 million ha of land in Latin America by 2020, though current pledges exceed 27.7 million ha. The execution involves a combination of agro-forestry and agro-pastoral activities, assisted reforestation and land restoration programmes, (Initiative 20x20, 2015).

In addition to being a goal-setting organisation, Initiative 20x20 is developing a supporting financial structure to raise the required finance, and serves as coordinating PPP platform to translate its goals into practice at the regional and local levels. The public sector takes on an enabling role by providing political support and regulation.

The financial structure consists of impact investors investing in restoration efforts on the ground. The aim is to develop a track record, establish links with other projects, provide access to technical assistance and set up a risk mitigation mechanism. With a definitive goal of 1 billion USD, current impact investment funds have already provided 730 million USD. The risk mitigation mechanism aims to boost private sector investments in restoration efforts, by serving as a first loss guarantee, covering the first 10% of any project losses. The mechanism is funded by the GEF and the Latin American Development Bank, its volume sufficient to cover 1 billion USD in investments. In addition, Initiative 20x20 is looking to channel ongoing restoration efforts through long-term debt financing, particularly for SMEs, either independently or through co-financing by sources such as the IDB, KfW and CAF. They anticipate that demand for long-term debt financing will exceed 3 billion USD (Initiative 20x20, 2015).

Moringa fund
The Moringa Fund is a PPP and technical assistance facility working with DFIs to upscale existing projects in the field of agroforestry. Sourced by public and private sector institutions, and with an average project budget from 5-10 million USD, the fund aims to provide proof of concept, develop a deal pipeline and reduce the risk of participation in the forthcoming second fund for institutional investors such as pension funds. Returns come in the form of carbon credits and premiums for agroforestry products associated with certification, such as those currently being collected in a coffee project in Nicaragua.

Initiative for Sustainable Landscapes by IDH, the Sustainable Trade Initiative
The ISLA program is recent initiative that builds on work by IDH focussing on transforming supply chains. At present, it is running projects in 11 landscapes producing agricultural commodities: the South West Mau Forest in Kenya, the Central Rift Valley in Ethiopia, the Taï Forest region in Côte d'Ivoire, the Central Highlands region in Vietnam, the Matto Grosso in Brazil, West Kalimantan in Indonesia and, more recently, 3 new landscapes in Liberia and 2 in Indonesia. ISLA aims to bring together public and private sector actors which are working at global and landscape levels to co-invest in the sustainable management of natural resources in locations where agri-commodities are produced. It takes on the roles of convenor, broker and co-investor with a focus on business and investment cases for various stakeholders. To cover future investments in public goods, ISLA also aims to make adoption

of their innovative approach a condition for guarantee for private sector investments in agriculture and restoration (Denier, Scherr, Shames, Chatterton, Hovani, & Stam, 2015) (ISLA, 2016).

Livelihoods fund
The Livelihoods Fund for Family Farming (L3F) was born out of the conviction that environmental degradation, climate change and rural poverty are interlinked. Its goal is to secure thriving livelihoods for smallholder farmers through the widespread adoption of sustainable agriculture delivering significant value across supply chains and landscapes. The L3F model is built on 3 main pillars: upfront financing for project developers to implement large-scale sustainable agricultural practices, agroforestry and watershed protection; connecting farmers and private companies to create sustainable supply chains; implementing large-scale projects providing maximum social, environmental and economic impacts. Returns are based on the sales of externalities generated by the projects (high quality commodities, carbon assets, water savings…) to a coalition of public and private offtakers. L3F is an evergreen fund and current investors include Danone, Mars, Veolia and Firmenich. The first project will be launched in 2016.

L3F provides a landscape approach bringing together interests of smallholder famers and private businesses on a win-win basis while sustainably contributing to mitigate climate change. Our key performance indicators, monitored over 10 to 20 years, are very strict to ensure maximum impact of our projects.

- Timothée Murillo

Commonland
Commonland is an initiative consisting of a foundation and a development entity, working together with different stakeholders to implement large scale landscape restoration. Set up by IUCN, Rotterdam School of Management and the COmON Foundation, Commonland works with the aim to generate four returns – inspiration, social capital, natural capital and financial capital, across 3 restoration zones – natural, combined and economic, with a long-term approach of 20 years. Its mission is to contribute to the large-scale landscape industry, align it with international policies and guidelines, and contribute to meeting the Bonn Challenge.

The foundation develops a restoration approach and works in close cooperation with scientific institutions, business schools and NGO experts. The development companies implement the restoration projects and develop local business cases, and the foundation supports fund raising. The foundation also acts as a network, resulting in a pipeline of projects that can help to build a positive track record for larger investments. A fund has been envisaged to help to start up projects and there are plans for setting up funds for impact investors and institutional investors (Brasser & Ferwerda, 2015). At present, Commonland is running projects in Spain, South Africa and, more recently, Western Australia and the Netherlands.

Terra Bella fund
The Terra Bella Fund carries out community-based forest and agricultural emissions reduction projects, with an average budget of 5-10 million USD. The fund, which focuses on providing early stage financial support raises capital from public and private sources, and offers returns in the form of carbon credits and co-benefits (FAO & Global Mechanism of the UNCCD, 2015).

"It takes time to legally set up a facility and then make sure that the flow of money would actually go where it needs to go on the ground, and you cannot invest until this infrastructure is in place."
Leslie L. Durschinder, Founder and Managing Director Terra Bella Fund (SIANI, 2016)

EcoEnterprises Fund II
The public-private partnership EcoEnterprises Fund II offers growth capital to businesses in

rapidly expanding sectors, quasi-equity, structured royalty streams and warrants, convertible notes and long-term debt financing for ecotourism, sustainable forestry and agriculture, and non-timber forest products. Launched in December 2011 with fund of 35 million USD, it focuses on supporting finance for companies unable to access finance from institutional investors due to their small size and lack of track record. Investments are screened according to the safeguards of the impact reporting and investing standards (IRIS) (Denier et al., 2015).

LDN Fund, Global Mechanism
The impact investment fund for Land Degradation Neutrality (LDN Fund), was initiated by the Global Mechanism of the UNCCD, and is still in development. Established as a PPP, it will use a combination of traditional financial instruments (quasi equity) and take on a financing and a coordinating role when identifying projects and measuring impact. The aim is to combine funding and technical assistance, whilst leveraging other investments. The fund will bring together various public and private institutions, such as DFIs and institutional investors, in an effort to support the large-scale rehabilitation of land for sustainable and productive use with long-term sustainable financing. Though still in the development phase, it has already come under criticism for its failure to address safeguard issues such, as land tenure, and its heavy focus on private sector funds (Both Ends, 2015). In response, the LDN Fund has taken on the development of a comprehensive framework for environmental and social performance standards.

The Landscape Fund (TLF)
TLF is a joint initiative between the Munden Project and CIFOR, aiming to address landscape issues by providing a diversified portfolio of long-maturity, low-interest loans to small-scale borrowers for sustainable agriculture and forestry activities. These loans will then be aggregated and offered to the international investment community. Geographical areas with low transaction costs and good opportunities for impact are identified via a statistical model which was developed by TLF and works with local financial intermediaries. (Denier, Scherr, Shames, Chatterton, Hovani, & Stam, 2015)

Great Green Wall Initiative (GGWI)
GWWI is supported by the African Union Commission (AUC) and FAO. This 41 million USD "Action against Desertification" was launched across 6 countries – Burkina Faso, Ethiopia, the Gambia, Niger, Nigeria and Senegal – and builds on the best practices of the Great Green Wall for the Sahara (2007). The aim is to achieve large-scale restoration of degraded and desertified production landscapes. Funded by the EDF, the FAO contribution includes assistance in coordination, monitoring and evaluation, capacity development, resource mobilisation and knowledge management for scaling up efforts (IISD, 2016).

Overview of large-scale ESR cases in the literature

Location	Project Name	Initiator	Biome/Ecosystem	Restoration type	Size (ha)	Enabling/Asset Mechanisms	Coordination mechanisms
Brazil	Atlantic Forest Restoration PACT	NGOs, research organisations	Fragmented tropical forest and cropland	Mosaic restoration and rehabilitation	60,000	Government regulation, fiscal incentives, PES scheme, water user fees, compensation, grants and microloans	Multi-stakeholder platform, regional investment funds
China	Grain to Gold, Sloping Land Conversion Project, Loess Plateau Watershed Project	National government	Grassland, forest, cropland	Wide-scale restoration and reclamation	1 million	Government regulation, subsidies, PES	PES
	Kubuqi China Desert	Private actor (salt company - Elion)	Dryland/grassland	Reclamation (reforestation)	600,000	Government regulation, equity	Multi-stakeholder platform
Colombia	Watershed restoration	National government	Tropical / sub-tropical forest	Wide-scale reforestation	87,870	Government regulation, grants	
Costa Rica	Pax Natura	National government	Tropical forest	Conservation and rehabilitation (reforestation)	615,000	Government regulation, tax on fuel, PES, grants, carbon credits, offsets, World Bank loan, GEF grant	PES, local facilitators, investment fund
Ethiopia	Tigray region	Local farmers, later national government	Croplands, grassland, forest, bushland	Restoration (reforestation) and rehabilitation, also conservation	960,000	Grants, concessional loans, in-kind	Community-based restoration
USA	Wetland mitigation banking	National government, later private sector	Wetlands	Rehabilitation and reforestation	17.4 million	Government regulation, offsets, equity (pension funds)	Wetland Mitigation Banks
South Korea	National Reforestation Programme	National government	Deciduous forest	Wide-scale reforestation and rehabilitation	6.4 million	Government regulation, grants, regional capacity building	Community based restoration (seedling nurseries)

South Africa	Namaqualand	NGO	Succulent Karoo/desert	Rehabilitation, riparian ecosystems	4 million	Grants, GEF grant	Critical Ecosystem Partnership Fund
	Baviaanskloof	NGO	Grassland, subtropical thicket	Landscape restoration	500,000	Technical assistance, grants	Local coordinator and regional development organisation and fund
Kenya	Imarisha Naivasha	National government and International NGO	Forest, cropland, wetland	Restoration (reforestation)	340,000	PES, water use fees, capacity building, technical assistance	PPP and forthcoming investment fund
Indonesia	Central Kalimantan Peatland Project	International and local NGOs	Peatlands	Rehabilitation	60,000	Short-term grant-based	Multi-stakeholder partnership
Vietnam	Mangrove restoration	National NGO	Mangroves	Restoration	18,000	Grants, in kind	
Rwanda	Nyabarongo-Akagera network and Rugezi	National NGO, national government	Wetlands	Restoration	165,000	Grants, in kind	
Niger	Maradi and Zinder Regions	Local communities, international NGOs and research organisations.	Sahelian Acacia Savannah	Restoration and assisted natural regeneration (agroforestry)	5 million	Government regulation for clearer customary land rights. USAID grants on condition of tenure reforms, IFAD donations.	Community Based Management
Tanzania	Shinyanga Soil Conservation Program or "HASHI"	National Forest Sector, local leaders	Tropical forest	Restoration and assisted natural regeneration (agroforestry)	500,000	Government regulation for clearer customary land rights. Long term investment NORAD.	Decentralisation of power to local authorities, local platforms.
India	National watershed restoration	National government	Evergreen, deciduous and tropical forest, desert, mangroves, meadows.	Watershed restoration	45 million	Government regulations to ban grazing, national afforestation programmes	Community participation and capacity building. Community groups function as effective institutional coordination bodies to work with implementing agencies and advance peer-to-peer learning