




# Reforestation and Restoration

Current approaches in San Martín,  
opportunities for reframing the debate and  
advice for greater biodiversity in restoration  
approaches



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## GLOSSARY

(Adapted from Di Sacco et al. 2021)

<b>TERM</b>	<b>DEFINITION</b>
Adaptive management	An intentional approach to making decisions and adjustments in response to new information and changes in context
Agroforestry	Restoration and sustainable management of existing agricultural land through integration of trees in the agricultural landscape
Afforestation	Creation of forest on areas not naturally forested in recent times
Applied nucleation	Planting trees in small groups or ‘nuclei’ and reliance on seed-dispersal out from such nuclei to restore forest cover across the entire restoration site
Assisted natural regeneration (ANR)	Managing the process of natural forest regeneration to achieve forest ecosystem recovery more quickly, through interventions such as fencing, weeding and enrichment plantings
Biodiversity/Biological diversity	The variability within and between ecosystems, species and genetic material
Deforestation	Destruction and degradation of forest
Existing native forest	Old- and second-growth, degraded and planted forests
Forest restoration	Restoration of degraded, damaged or destroyed forested areas (see Restoration)
Forest (and) landscape restoration (FLR)	Ongoing process of regaining ecological functionality and enhancing human well-being across deforested or degraded forest landscapes
Framework species approach	Planting a mix of tree species, typical of the target forest ecosystem, that catalyse forest regeneration by shading out herbaceous weeds and attracting seed-dispersing animals.
Nature-based solutions (NbS)	A range of approaches which “promote nature as a means for providing solutions to climate mitigation and adaptation challenges” (Nesshöver et al. 2017: 1216)
Natural regeneration (NR)	The process of natural forest regrowth, which can occur spontaneously following land abandonment or be assisted by human interventions (see Assisted Natural Regeneration)
Non-timber forest products (NTFPs)	Commodities obtained from a forest without logging, for example, fruit, honey, mushrooms, medicinal plants

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Old-growth forest	Also called primary or virgin forest. Forest that has not been recently disturbed
Payments for ecosystem services (PES)	Financial incentives for managing land that provides an ecological service, for example, watershed protection
Proforestation	Protecting existing natural forests
REDD+	Programme from the United Nations for ‘Reducing Emissions from Deforestation and forest Degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries’
Reforestation	Re-creation of forest on a previously forested area
Restoration	“The process of assisting or allowing the recovery of an ecosystem that has been degraded, damaged, or destroyed” (Ockendon et al. 2018: 199)
Restored native forest	Native forest ecosystems reinstated on degraded land
Second-growth (or secondary) forest	Forest grown after recent disturbance
Soil organic carbon (SOC)	The carbon component of organic matter in the soil

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## I. INTRODUCTION AND APPROACH

Reforestation and the restoration of degraded forests is a core component of the Sustainable Development Goals (SDGs 15.1; 15.2) and the Convention on Biological Diversity's Aichi Biodiversity Targets (14; 15), and is likely to come into even greater focus through the UN's Decade of Ecosystem Restoration (2021-2030) and in the post-2020 Global Biodiversity Framework. Recent years have, as such, seen a proliferation of global and regional targets for the restoration of forests. The Bonn Challenge, for example, has targeted the restoration of 150 million hectares of land by 2020 and 350 million by 2030 and Initiative 20x20 set a target of 20 million hectares of restored land in Latin America by 2020, 3.2 million hectares of which was committed by Peru. Similarly, the Trillion Tree Campaign launched at the World Economic Forum in Davos pledges to plant a trillion trees across the globe, bringing together global climate goals, private sector investments and numerous local projects and communities.

Peru has pursued reforestation projects at a rapid pace – and with great success – with the Ministry for Agriculture (MINAM), the National Fund for the Environment (FONAM) and the National Forest and Wildlife Service (SERFOR) in particular, promoting forestry concessions across the country, helping to drive a boom in carbon market reforestation schemes. Internationally, the growth of this market has been largely thanks to a growing interest in 'nature-based solutions' – a range of approaches which “promote nature as a means for providing solutions to climate mitigation and adaptation challenges” (Nesshöver et al. 2017: 1216). Nature-based solutions have proved particularly popular with private companies and consumers thanks to their link between carbon sequestration projects and presumed biodiversity and local development benefits.

To date, however, many of these projects, in Peru and beyond, have taken the form of plantations of rapid-growth species for timber or commodity-crop agroforestry systems, with emerging evidence that major targets create perverse incentives for monocultures and low-diversity reforestation at the expense of natural regrowth and forest (Hua et al. 2018). Research has shown that this form of reforestation provides, at best, mixed evidence of biodiversity benefits and that the resulting monocultures – or near monocultures – present a greater risk to pests, diseases and wildfires (Holl

and Brancalion 2020, Heilmayr et al. 2020, Pérez-Silos et al. 2021). This raises multiple questions about their suitability as a long-term restoration strategy and threatens their viability as an offset mechanism. Private sector actors, in particular, are likely to be driven away from investment in these schemes as the reality of the plantations and their instability become clear and face backlash from the general public, with negative news stories and critical NGO reports already increasing in frequency<sup>1</sup>.

This short report summarises evidence and analysis from a research project exploring reforestation projects in the region of San Martín in Peru. It builds on a total of 12-months of ethnographic fieldwork, based predominantly in the province of Mariscal Cáceres, conducted between 2017 and 2019, and research into those designing and marketing reforestation projects in Europe. Fieldwork included visits to communities and villages across the region and 68 semi-structured interviews with producers, reforestation practitioners and regional, provincial and local government actors, utilising a snowball sampling approach to identify relevant groups. The report also builds on analysis of a range of documentation on reforestation projects in Peru and beyond – from local NGOs and external consultants – as well as to the wider marketing material surrounding conservation and reforestation in the region.

The report suggests that more support and funding is needed for developing forest restoration with a focus on biodiversity alongside diverse agricultural production systems. This requires a change in mindset from mass tree-planting to ecological restoration, defined as “the process of assisting or allowing the recovery of an ecosystem that has been degraded, damaged, or destroyed” (Ockendon et al. 2018: 199). By differentiating between reforestation approaches and restoration, projects could, in turn, command a higher value as a ‘charismatic’ or ‘boutique’ offset and appeal to more sources of finance for sustainable forest management (in line with SDG 15.b). The report offers recommendations for practitioners and policymakers, chiefly within Peru, on how to promote scalable and participatory approaches to the restoration of natural forests as an alternative mechanism of participatory forest management and avenue of carbon funding. It is thus intended both as a record of

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<sup>1</sup> See, for example, a recent article in The Financial Times (<https://www.ft.com/content/81d436c2-79f1-4a43-ab52-cbbcd149df>) and an investigation from Greenpeace and the UK newspaper the Guardian, (<https://unearthed.greenpeace.org/2021/05/04/carbon-offsetting-british-airways-easyjet-verra/>)

issues with the current approach to reforestation and to help identify alternative methods of ecological restoration. It firstly provides some brief context on the reforestation carbon credit market in Peru, before presenting analysis and recommendations in turn.

## REPORT TOP-LINE SUMMARY

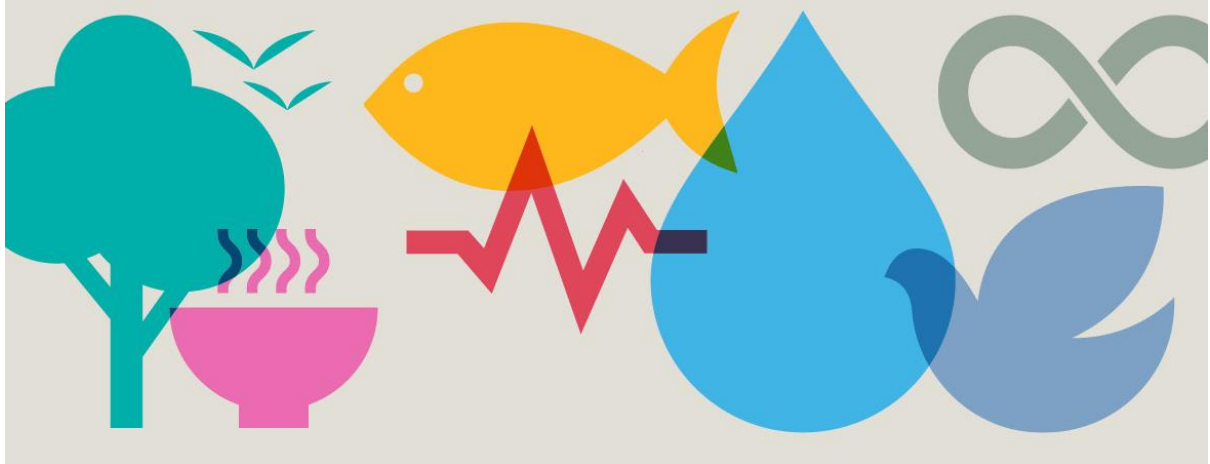
Reforestation in its current form tends towards monocultures of fast-growth species for timber harvesting

This fails to deliver on the promised goals of ecological restoration on multiple levels, raising numerous risks as a mitigation strategy and funding stream

There is a compelling ecological, economic and social case for designing restoration schemes to market to international donors and offset schemes

These projects can be scalable and participatory, contributing to SDGs 1, 2, 3, 5, 6, 10, 13, 15 and 16

Restoration projects can also deliver enhanced biodiversity benefits, contributing to post-Aichi goals



## II. INTERNATIONAL DEMAND FOR REFORESTATION PROJECTS

The carbon strategy for Peru (Government of Peru 2016) is focused on the growth of a carbon offset economy, specifically through REDD+, improving agricultural and forestry productivity and land management systems (UFF Partnership 2016). The strategy of SERFOR, further highlights the role of forestry in the carbon economy, emphasising the need for the incentivising of forest plantations for recovering degraded areas and increasing forested areas. While FONAM specifically manages the ‘National Carbon Portfolio’ – which includes registered projects in voluntary markets, the Clean Development Mechanism and the development of state-based REDD+ projects – and promotes environmental investments in Peru to state and non-state actors globally, there are a range of national, regional, public and private organisations involved in this boom of reforestation. This includes forestry management and reforestation programmes managed at the national level, at a local level through Regional Environmental Authorities and emerging companies such as Reforesta Peru, who install plantations designed for optimal return on investment across the country.

The increasing attention to reforestation as an offsetting and local development mechanism is reflected in Peru’s success in developing projects to be traded on the voluntary carbon markets. While forestry and land use projects were once considered a risky offsetting mechanism, they have surged in popularity in recent years helping the voluntary markets reach seven-year highs in volume in 2018 (Donofrio et al. 2019). This growth was spurred geographically by Latin America and the Caribbean, with the region’s market share ballooning from 13% in 2016 to 37% in 2018. Over half (57%) of the overall global increase in volume between 2016-2018, however, came from Peru alone – accounting for 86% of the overall 22.8 MtCO<sub>2e</sub> increase in volume from Latin America. Nearly all of Peru’s growth came via REDD+ projects – and without Peru, global REDD+ volume on voluntary markets would have been virtually unchanged in the 2016-2018 period (Donofrio et al. 2019).

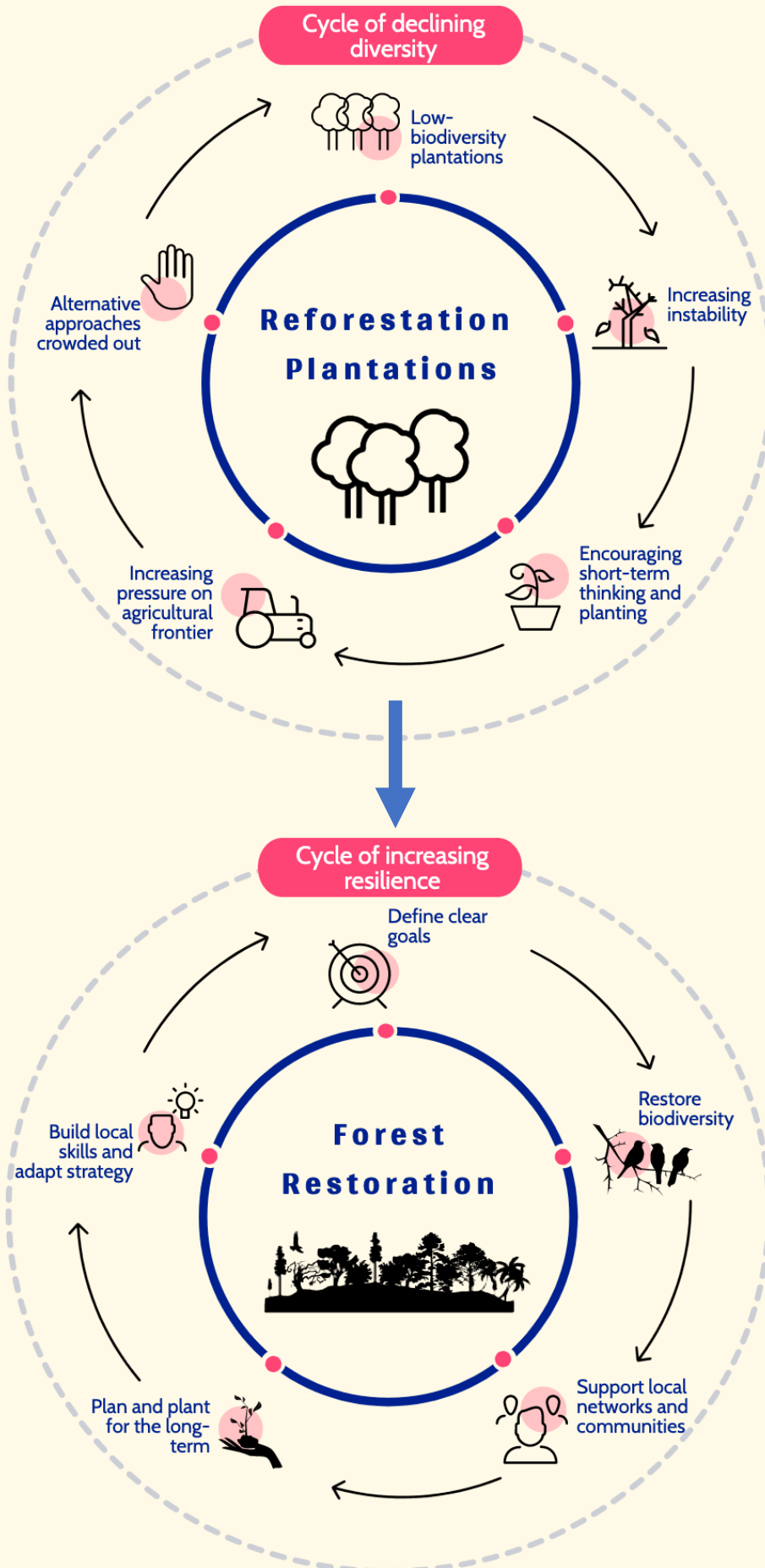
This fast growth in the context of Peru was driven in a large part by the emerging discourse on ‘natural climate solutions’ or ‘nature-based solutions’, with a particular focus on reforestation projects (Donofrio et al. 2019). These schemes often market



themselves as recovering degraded land back to biodiverse, natural growth forests. Reforestation credits command a premium above other methods of offsetting. In 2016, for example, the average price of a voluntary market credit was \$3.0/tCO<sub>2</sub>e, while a REDD+-based credit was \$4.2, with reforestation projects specifically selling at an average of \$8.1 (Hamrick 2017). Alongside its popularity with companies and consumers, reforestation also often include a number of potential ‘co-benefits’ to local communities, particularly when integrated into agroforestry systems. For example, a coffee agroforestry system integrating trees into farmers’ plots can improve the production process through a range of benefits to soil, water systems, air quality and crop quality. This means that simple models of plantations and agroforestry can expand rapidly and has led to the emergence of a range of organisations who are able to monetise these schemes (see, for example, the World Resource Institute’s *The Business of Planting Trees* report (Faruqi et al. 2018)).

San Martín has been a leader in this drive towards reforestation within Peru, with numerous large plantations planted and planned, notably in many protected area buffer zones. According to regional government presentations, from 2013-2018 441 certificates for forest plantations were authorised with an area of 1,758.04 hectares, and multiple groups – within the regional government, local businesses and local farmers – spoke of plans to expand this. The current strategy for the reforestation of degraded areas promoted by the Regional Government of San Martín (GORESAM) aims to produce and plant 10 million trees by the end of 2022, with 780 hectares already involved in regionally administered reforestation schemes involving individuals, committees, communities, municipalities, producer associations, farmers’ unions and private companies. These projects are largely designed for productivity, supporting commodity crop production – most notably cacao – and the expanding timber sector.

The emerging model of reforestation has thus proved enormously popular in Peru, but represents a stark disconnect with the recovery of dense and diverse forest advertised to buyers of carbon credits. This report now briefly summarises the key issues observed during fieldwork on reforestation plantations, before offering some recommendations for more diverse restoration approaches.



### III. ANALYSIS OF REFORESTATION IN SAN MARTÍN

#### 1. Reforestation plantations tend towards low biodiversity

For many purchasers of carbon credits, reforestation projects are expected to add to the biodiversity of the land or for more holistic benefit. Yet, on a global scale many schemes are focused on fast growing trees chosen largely for short-term economic benefits (Pérez-Silos et al. 2021). This is the case in San Martín, with most plantations focused on timber production or agroforestry with the plantations able to be harvested sustainably in a rotational system. While these plantations are optimised to meet minimum forest definitions under Peruvian and UNFCCC accords – a minimum area of 0.5 hectares, a minimum tree crown cover of 30% and a minimum tree height of 5 meters – there is a tendency towards a lack of diversity of trees planted, leaving virtual monocultures of little benefit to local ecosystems.

Even when plantations are designed to contain a combination of trees of short, mid and long-term growth, farmers in the region prefer the rapid growth species, such as *bolaina* and *capirona*, which can be matured, cut and sold in 5-7 years, making genuinely diverse planting systems difficult to promote. As noted by one international project developer, “we tried to promote more diverse [plots]... we said [...] three species parcel minimum. But, in some cases, you know, the farmers really insist on having lots of capirona, lots of bolaina.” This was reiterated by a number of reforestation workers. For one large developer, for example, work from 2010 to 2015 had focused on a *minimum* of eight species of timber in any plot, but had since reduced to a *maximum* of two or three, resulting in plantations with next to no biodiversity. In this case, while the developer acknowledged that diverse plots were better for environmental reasons, the number of species was reduced, sometimes to monocultures of bolaina, capirona or eucalyptus, because for producers the ultimate goal is the extraction of as much timber as possible.

Trees are, as such, grown in dense plots tightly packed with each other and the actual diversity of species in *chakras* rarely goes further than few fast-growth varieties. While project workers, regional politicians and local farmers may all want long-term sustainability, the reality tends towards decreasing diversity in the approach and

monoculture production systems. This is problematic from a market perspective as consumers and carbon credit buyers often expect to be supporting the recuperation of ‘forest’ (‘bosque’) not forestry (‘foresteria’), raising a potential future risk for project funding and the wider reputation of reforestation credits.

## 2. Low biodiversity increases project risks

The incentives for monocultures, plantations and fast-growth tree species at the expense of natural regeneration is potentially damaging to wider biodiversity and leaves these areas particularly vulnerable to pests and wildfires (Fleischman et al. 2020). Fast-growing tree plantations have historically resulted in large-scale failures as they deplete water resources, negatively impact biodiversity and lose local support (Pérez-Silos et al. 2021). Diversity is key to resilience and without genuine biodiversity, the agroforestry and reforestation plantations risk increasing economic and ecological instability, while having questionable long-term carbon benefits. This places a large degree of risk on these schemes as they are often reliant on international funding.

On field trips to visit agroforestry and forestry plantations across the region, low quality of soil and absence of fauna in plantations was observed in almost all cases. The lack of diversity of tree species combined with an intensification of timber and commodity production – with fertilisers and farming practices pushed to extract as much as possible – leaves areas lacking in biodiversity. Pests and diseases were also notably present in many plots and increasing across the region, reflected in high levels of tree morbidity in various schemes. In some areas there was even the use of species not suited to their surroundings, such as rapid growth trees in flood prone areas, increasing likelihood of project failure.

In San Martín, the lack of tree diversity in plantations is compounded by the fact that very little attention is paid to biodiversity in general, with little funding put towards building the skills of local actors to understand local flora and fauna, rather than forestry. As such, knowledge of biodiversity appears almost irrelevant or a presumed benefit to many projects and local actors are often unaware of the risks of a monoculture approach to tree planting. This is problematic for long-term project funding as offsetting schemes are reliant on an assumption of stability, and fires, floods and pests can devastate forests.

### 3. Plantations encourage short-term thinking

Tree mortality risks are increased by a prevalence of short-term thinking in reforestation schemes. This is reflected globally where ambitious and well-funded tree planting campaigns focus on the short-term goal of planting statistics, rather than the long-term goal of maintaining healthy forest (Duguma et al. 2020, Fleischman et al. 2020, Di Sacco et al. 2021). Short-termism in tree planting is often seen as pragmatic, focusing on low-cost incentives targeted at tree planting which engage local communities, but can make long-term buy-in from communities harder to secure as projects fail to live up to initial expectations. As noted in an academic review of tree planting schemes globally “glamorizing and rewarding the act of tree planting undermines local institutions and social networks that are required for long-term carbon sequestration” (Fleischman et al. 2020: 3).

In San Martín, the approach to reforestation prioritises financial rewards over the other benefits local communities might receive from projects (public goods, non-timber forest products, intrinsic benefits), often framing agroforestry and reforestation as a business to extract maximum profit. Producers spoken to for this research reflected this business-driven approach to reforestation. As one farmer noted: “to those who are reforesting, I say, don’t look at it simply as reforestation, look at it as a business. Because it is a business. Because you are sowing to harvest. It’s a business.” Project developers see this as a means to an end – a short-cut to provide incentives that will eventually lead to better environmental outcomes – but it also undermines attempts to support longer-term and less financially lucrative goals such as forest preservation.

The timber trade in particular is being pursued at such a pace as to be considered the biggest hope for economic diversification in many protected area buffer zones, particularly with new REDD+-funded reforestation plantations certified by the FSC in 2019. Multiple project leaders and government workers enthused about the growth of the sector, placing it at the core of both various project plans and the regional productive strategy of certain valleys. One regional head of conservation even considered a functioning timber trade as their ‘dream’ for the future of the area. The tree-planting plans of the region equally focus on developing the area into a timber

exporting powerhouse within Peru, with major profits being promised to farmers. In one valley, farmers were being told that reforestation would earn them millions with little to no risk. In the valleys where the reality of these projects is becoming clear – with tree mortality, a difficulty in selling timber and lower than promised prices – frustration is growing with the approach. A focus on reforestation as productive and profitable may thus prove popular in the short-term, but risks longer-term project failures.

#### 4. Pressure on the agricultural frontier is increased

Recent research has shown that combined conservation and development projects in San Martín can in fact lead to higher deforestation rates, as the focus on increasing agricultural productivity results in an expansion of agricultural area over time, even when conservation is an explicit goal (Chambers et al. 2019). Reforestation through plantations and agroforestry risks a similar dynamic, as farmers use funding from projects to expand and plant in new areas. Rather than stabilising the agricultural frontier, it thus risks its further expansion.

The perception that the forest is a store of vast and immediate profit is commonplace in communities across San Martín. In valleys where reforestation and agroforestry plantations are already prevalent, farmers discussed plantations as a source of pride and to be expanded, with the seemingly unproductive forest seen simply as waste. This emphasis on managed forests was even reflected on trips into protected areas, where recovering areas of jungle were deemed in need of ‘reforestation’. Even though the forest was recovering on its own – and in doing so might produce some unique habitat for local biodiversity – produced landscapes poor in diversity were seen as preferable to the dense foliage of the wilder areas. Local community members frequently referred to the diversity of uncultivated forest and especially shrubby areas growing back naturally and slowly, as ‘poor’ or worthless, as there was no timber species present – or that they needed to be turned into plantations. This makes any subsequent expansion into these areas far harder to stop, with a risk to deforestation rates and a longer-term supplementing of natural forest with highly-managed monoculture plantations.

The promise of major financial windfalls from reforestation is also attracting more people to the region, increasing pressure on the agricultural frontier and potentially

fuelling land speculation. This is reflected in increasing deforestation in numerous buffer zones where reforestation projects are centred. For example, while deforestation rates in San Martín have appeared to stabilise from their peak in 2012, they have almost doubled in the areas of Alto Huayabamba with a high number of reforestation projects. While REDD+ projects often include a degree of flexibility to cover increases in deforestation, this is problematic from a reputational perspective and has already led to negative coverage of certain projects in international media (see above).

#### 5. Alternative approaches are crowded out

The issues raised above reflect the uncertainty and instability of plantation forestry that is emerging in research from various parts of the world where projects are failing to provide benefits for local people and ecosystems, but they can also contend for land that may have been used for more biodiverse projects (Fleischman et al. 2020) and ‘crowd out’ other approaches to supporting and inspiring conservation (Agrawal et al. 2015). In particular, the productive approach to reforestation places greater emphasis on other projects to deliver financial benefits.

One leader of a conservation NGO in San Martín noted how the financial approach to conservation has slowly begun to dominate the discourse of the region. Another explained how, purely in a logical progression of what was deemed successful, they had become increasingly focused on financial rewards and ‘productive’ economy-based projects, to the point where most conservation project proposals were 80% focused on the local economy. The focus on reforestation – and particularly its integration with agricultural goals – therefore adds pressure on conservation in the region and represents a potential threat to projects that are not geared towards productivity goals. Such is the current attraction of reforestation to funders and policy-makers that one long-time conservation worker in Peru joked that he would have to rebrand his organisation’s conservation work as “avoided reforestation” to appeal to funders.

While a focus on ensuring projects contribute to local economies is positive, there is a risk that it makes alternative approaches – such as attempts to engage with the local

politics of diversified landscapes, multicropping, diverse production systems or production for self-consumption – increasingly difficult to promote. Indeed, other approaches in San Martín do exist – from the few nascent restoration projects and projects using biochar to grow a mega-diversity of crops largely for self-consumption – but support for these projects is limited in favour of the financial gains and claimed forestry benefits of reforestation and agroforestry plantations. This narrows the development pathways available to communities and increases many groups' exposure to market risk.



## IV. RECOMMENDATIONS

The analysis above highlights the challenges to current approaches to agroforestry and reforestation plantations, and the inherent risks as a funding mechanism in a climate in which many carbon credit buyers are likely to move towards more diverse restoration projects. As the growing scientific literature and public response to high-profile project failures are noting, tree planting is not a simple solution and schemes can lead to poor outcomes for local communities and ecosystems (Holl and Brancalion 2020). While fast-growing tree plantations can be a useful tool for economic development, this final section summarises our recommendations for how tree plantations can be complemented by scalable, participatory approaches to long-term restoration in Peru. Such an approach is not just a sensible way to limit the risk of a single model of reforestation, but also an opportunity to appeal to potential new funding streams for biodiversity-focused restoration efforts.

### 1. Define clear goals and markers of success

Current approaches to reforestation promise ‘win-win-win’ outcomes, with no apparent trade-offs between biodiversity, deforestation and development goals. Rather than assuming universal benefits, restoration aims should have clear objectives and trade-offs. These objectives might be conservation of biodiversity, connectivity of landscapes, restoration of natural processes, social involvement, training and skill sharing or access to food, water and other public benefits, but must be clear and realistic in what projects can and can’t achieve. Such clarity will provide the basis for more genuinely participatory work with communities and decrease the risk of frustrating funders by not delivering on promises.

### 2. Support and promote projects in restoring biodiversity

Clear guidelines should be produced on the difference between reforestation and agroforestry plantations, and restoration approaches in the Peruvian context. This serves the dual purpose of highlighting genuine restoration projects for additional support and offering clarity to carbon credit buyers who could be persuaded to pay a higher premium for restoration projects. There is a strong business case for doing so. In San Martín alone, prices for carbon credits range from just \$1 per tonne of carbon

dioxide equivalent (tCO<sub>2</sub>e) to \$14, with the difference based on the added value of conservation or reforestation work. A clear offer of a restoration credit – with local participation and enhanced biodiversity outcomes – could increase the value of state-monitored carbon credits, increase the number of opportunities to capture funding and deliver on global targets such as the SDGs and post-Aichi targets.

### 3. Build local networks of support and spread community forests

While participatory approaches are often used in San Martín, this report suggests that they are limited in the actual options presented to communities. Emphasis should be placed not only on financial incentives, but how areas are used and the public goods that communities might desire. Participatory mapping (such as conducted by CIMA, for example, see below), can provide the basis for landscape-level planning and reflect more holistic goals, with communities highlighting areas where ecological stress is highest, where animals are declining and the types of animals hunted, as well as where non-timber forest products and uses are valued. While this represents a more difficult and time-consuming process of engaging with community desires, a focus on community building and public services rather than extraction and export could also help to decrease the pressure on the agricultural frontier, offering longer-term stability to these regions and projects.

### 4. Plan and plant for the long-term

Plans for restoration areas must be focused on a wide diversity of slow-growth species and long-term forest maintenance, rather than just short-term planting targets. While this can include plans for natural regeneration or applied nucleation – where certain species are planted to encourage wildlife and over time assist in dispersing seeds – it can take many years for areas to be restored. In this time, areas can be seen as messy or a wasteful use of space as undergrowth and weeds are left uncut and allowed to develop. If reforestation is presented as a business opportunity, producers will naturally pick the quickest growing trees. Instead, restoration should be presented to local communities as a long-term commitment, with public goods and benefits that will be felt over time and that will strengthen communities. This will help restoration initiatives to secure long-term buy-in to deliver on biodiversity goals.

## 5. Build local skills and adapt plans to meet changing realities

Restoration projects should be linked to future jobs and build local skills while constantly adapting to outcomes as they become apparent. Given the increasing international interest in research for restoration, there is great scope to build local skills, strengthen inter-community skill sharing and build local adaptive capacity. This represents not only an opportunity for local talent, but also a potential way for Peru to develop a regional specialism of knowledge, to rival the growing academic literature on restoration ecology in Argentina and Colombia (Root-Bernstein et al. 2017). This knowledge should be utilised as it is built, creating a system of adaptive management where projects are flexible to change and refinement as knowledge of restoration areas becomes more nuanced.

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