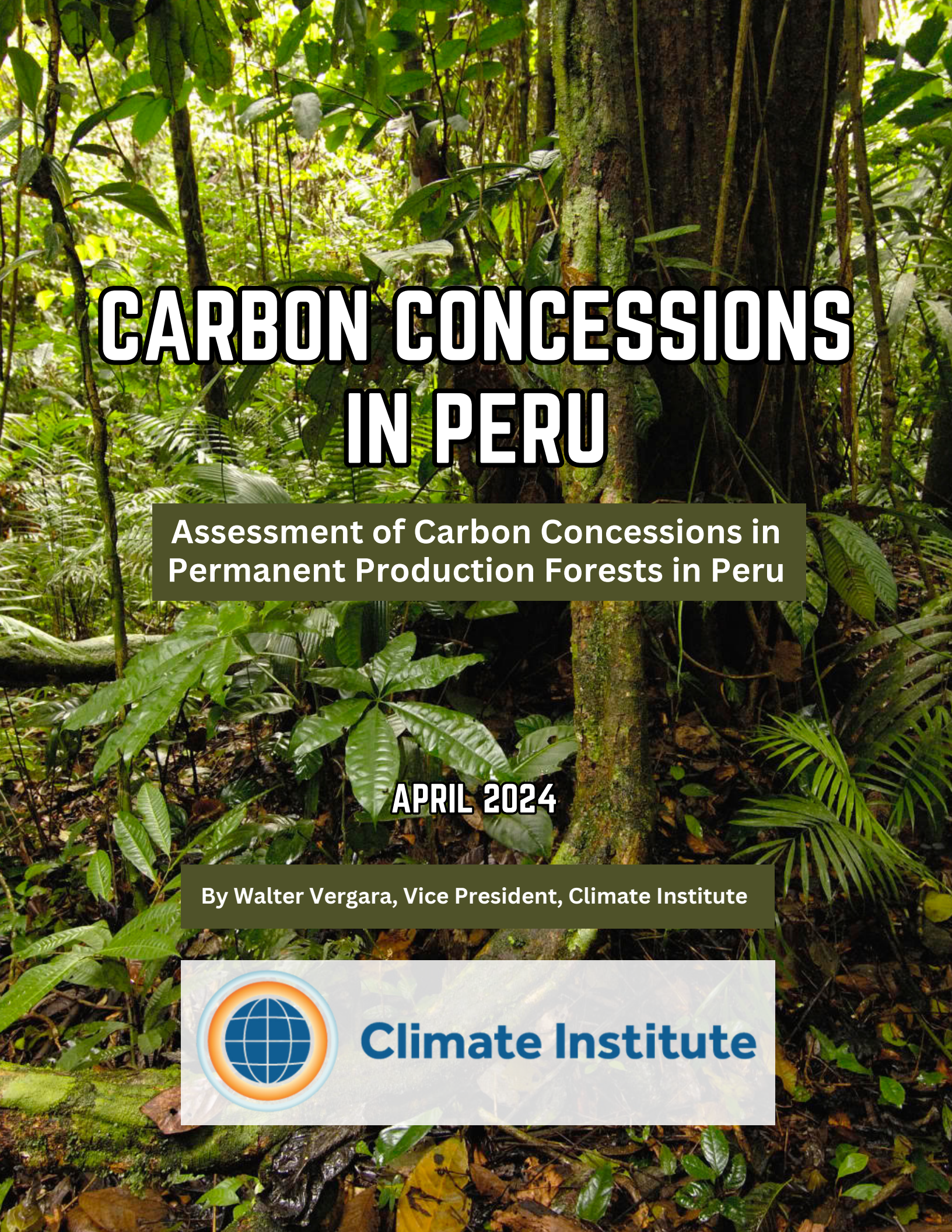

CARBON CONCESSIONS IN PERU

Assessment of Carbon Concessions in Permanent Production Forests in Peru

APRIL 2024

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Climate Institute

TABLE OF CONTENTS:

Cover Photo: Division de catastro, zonificación y ordenamiento SERFOR

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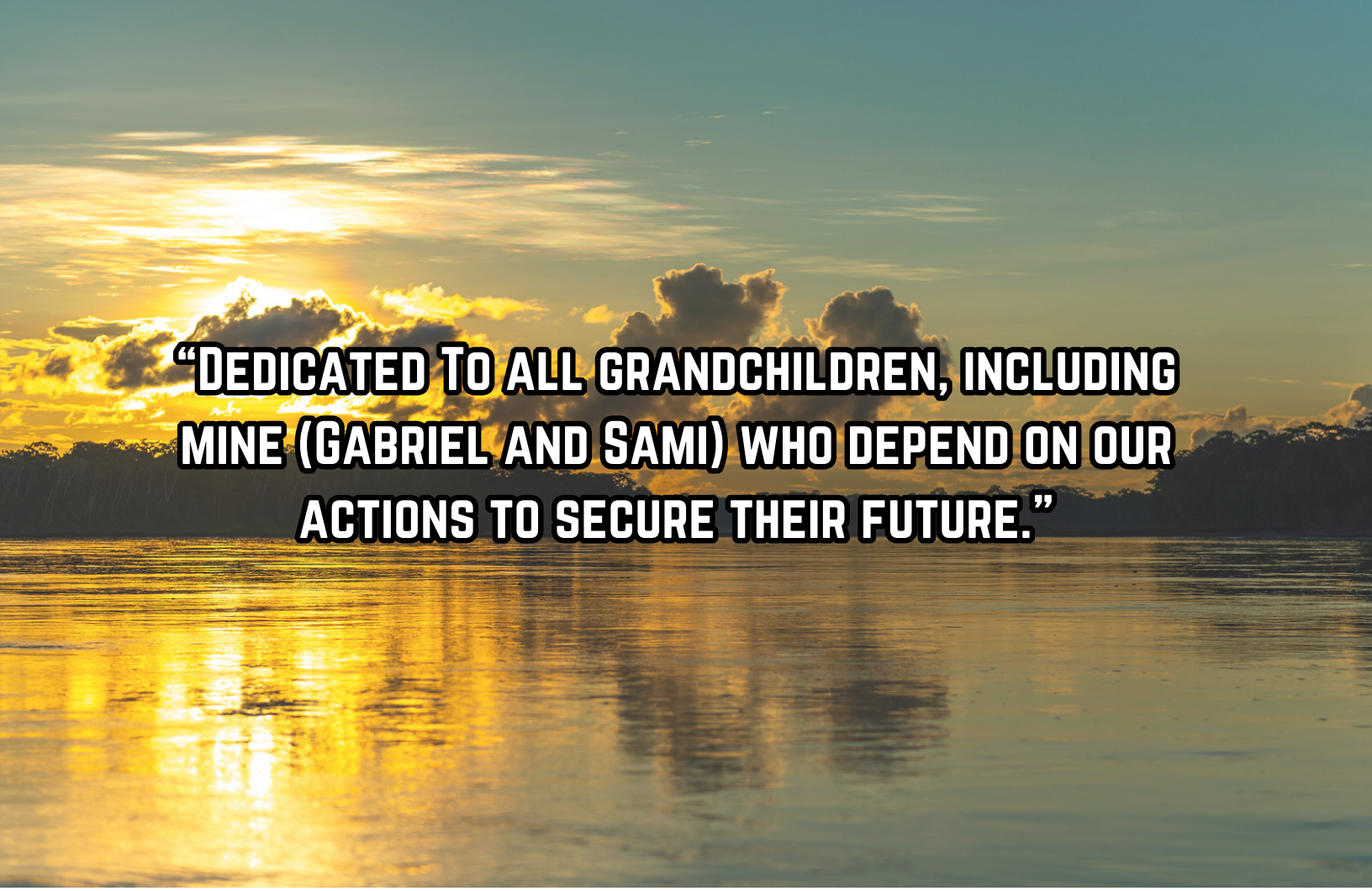
Abstract

This report examines the context and performance of forest concessions in Permanent Production Forests in Peru, documenting their impact on the economy and reviewing the overall results of the concession system. The analysis assesses the financial outcomes of both 100,000-hectare (ha) and 50,000-ha forestry concessions, as well as similarly sized concessions focused on avoiding logging to reduce carbon emissions, and a 30,000-ha plantation of native precious hardwoods.

Despite forest land being one of the nation's largest natural capital assets, the wood sector does not proportionally contribute to the economy. Most current forestry concessions, particularly those under 50,000-ha, are unlikely to yield financially attractive results. To achieve profitability, small concessions would need to aggregate in scale. Larger concessions (100,000-ha and above) are financially viable under current market and regulatory conditions and promote efficient and sustainable resource utilization.

Avoiding logging in approved forestry concessions to reduce carbon emissions could generate high-quality, credible carbon assets, characterized by robust additionality and permanence and therefore could benefit from premium prices in the carbon market. Under these conditions, the use of Permanent Production Forests for carbon reduction/removal activities as an “Improved Forest Management” use, could yield better financial results when compared with forestry concessions under current markets. However, these activities entail lower economic activity and require a smaller labor force. Nonetheless, they offer better protection for natural capital assets and may contribute to governance improvement and reduced illegality.

Scaling up the use of carbon concessions could displace timber in the domestic and export markets. Investing in plantations of precious hardwoods in degraded areas could meet these requirements over time but demands significant investment in technical capacity, training, and nursery production. Plantations of native species, however, would generate higher economic activity, employ a higher-quality labor force, and may result in valuable carbon removals. Developing native species plantations would drive R&D investment in forestry, alleviate pressure on primary forests, and advance the nation's forest restoration objectives.



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PERU'S FOREST ECOSYSTEMS REPRESENT ONE OF THE RICHEST BIODIVERSITY ASSETS WORLDWIDE AND ACCOUNT FOR A SIGNIFICANT SHARE OF THE NATURAL CAPITAL OF THE NATION.

Photo: Division de catastro, zonificación y ordenamiento SERFOR

Objective

The objective of this analysis is to assess the use of carbon concessions[1] in Peru's Permanent Production Forests and review implications for the existing regulatory architecture and markets.

Scope

The analysis summarizes the existing policy and institutional framework defining the use of concessions in Permanent Production Forests (forests identified and made available for the sustainable production of timber and other products). It reviews the performance and impact of forest concessions, evaluates their efficacy and limitations, and examines compliance with the provisions under the laws.

Additionally, it includes a review of relevant experience with carbon concessions in the region, exploring the lessons that could be applied to a system of carbon concessions in Permanent Production Forests in Peru. The review also encompasses an analysis of the conditions established under Article 6 of the Paris Agreement, as applicable to potential carbon concessions.

The analysis assesses the likely financial performance of carbon concessions developed out of existing forestry concessions and identifies adjustments in the existing regulations or other reforms necessary to allow carbon concessions to operate in Permanent Production Forests. Furthermore, it reviews the adoption of plantations of native species on already degraded/deforested land to compensate for any shortfalls in the timber market, if some Permanent Production Forests shift to carbon concessions.

Context

Peru has close to 72 million-ha of forested land (56% of its land area), with over 80% being publicly owned. Peru's forest ecosystems represent one of the richest biodiversity assets worldwide. They provide most of the fresh water supply in the country, are the source of a variety of timber and non-timber products, and are home to over fifty ethnic groups, some which have yet to contact the outside world. Forests in Peru account for a significant share of the natural capital of the nation.

[1] In this report carbon concessions refers to the bypassing of logging at forestry concessions in a permanent production forest for the purpose of avoiding carbon emissions.

Context (*continued*)

Of the total forested area, about 19 million-ha are preserved by the nation in national parks, reserves, sanctuaries and refuges, managed by the National Service of Protected Areas (SERNANP) at the Ministry of Environment (MINAM). In recognition of the wealth represented by standing forest ecosystems, and their value for future generations, MINAM has a goal to eventually protect about 50 million-ha. Further, the Ministry of Agricultural Development and Irrigation (MIDAGRI) has responsibility over the sustainable management of natural forests not under protection, ensuring their contribution to the welfare of the nation through the production of timber, non-timber products, and other products and services.

Despite these efforts, the rate of forest loss in Peru has remained high. In 2023, the loss of humid tropical primary forests was 150,000 ha., and the loss of total natural forests was 227,000 ha (www.globalforestwatch.org). Main drivers of deforestation and degradation include the expansion of the agricultural frontier, unsustainable logging, expansion of mining activities, and land speculation. One direct result of the high rate of deforestation is that 50% of the GHG emissions in Peru are related to land use and land use change (UNFCCC, 2020) with deforestation accounting for an overwhelming share of these (over 75%), and the balance linked to agriculture and waste disposal. The high deforestation rates require of a renewed effort to conserve and sustainably manage forest land.

To address the issue, Peru has committed to a major effort to arrest deforestation and promote restoration of forest lands and degraded agricultural areas. To deter deforestation, Peru is approving a set of climate change-related policies to reduce deforestation and protect watersheds and biodiversity; they are joining the Tropical Forest Alliance to promote public-private partnerships to promote deforestation-free agriculture, one of the main causes of deforestation; additionally, they are developing a National Forestry and Climate Change Strategy to diagnose and counter the major threats to Peru's forests. In terms of restoring degraded forests, MIDAGRI has enacted the National Ecosystems Restoration and Degraded Forest Lands Strategy 2021-2023 **(**ProREST[2]), an ambitious effort that establishes a strategy for forest restoration with a goal of restoring 3.2 million-ha, including in degraded agriculture and deforested lands.

[2] Ministerial Resolution 338- 2020-MIDAGRI.

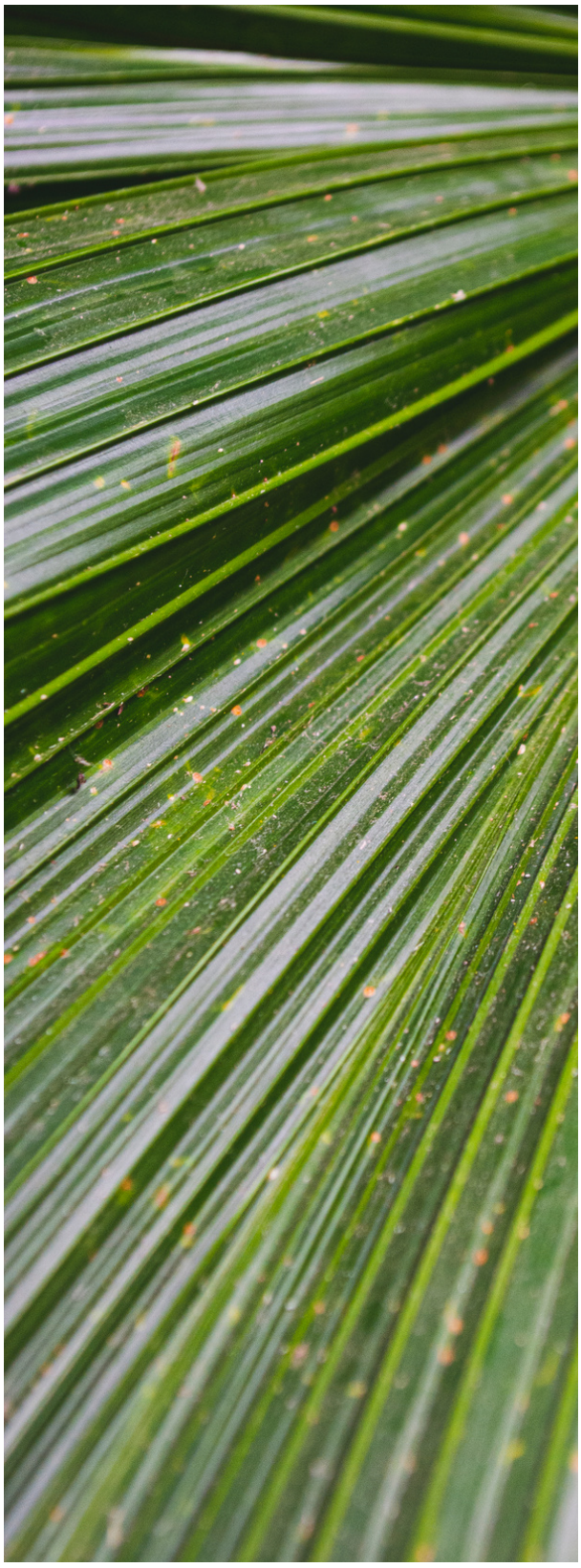
Summary of the Policy and Institutional Architecture for Forestry Concessions

Legal Framework

Inspired by the need to ensure sustainable management of forest resources not under protection, Peru enacted the Forestry Law (Law 29763) in 2015 which established a legal framework to regulate, promote, and supervise activities related to forests and wildlife including regulations for forest management, forest plantations, and agroforestry systems. The Law intends to “promote the conservation, protection and sustainable use of forests and wildlife” in the nation.

The law defined “permanent productive forests” as primary forests that through a government resolution are available to be exploited to produce timber and non-timber products in a sustainable manner. It established a robust institutional, policy, and regulatory framework for forest operations including, inter alia, a requirement for forest management plans. In terms of logging, the Law allows for concessions, which are formal contracts valid for up to forty years between the government and the concessionaire on specific tracts of public land for sustainable production of timber and other forest products. It also introduced a comprehensive institutional framework designed to ensure that logged trees come from concessions and not from surrounding unauthorized or sensitive areas.

Summary... *(continued)*



Institutional Mechanism

Under the law, the National Forest and Wildlife Service Organization (SERFOR) was established as the leading agency in the supervision of the policies in the forest sector, responsible for the enactment of regulations seeking the long-term management and sustainable use of forests and wildlife resources. SERFOR was made responsible for the national forest inventory, as well as other inventories in permanent production forests and for collaborating with other sectors and institutions to meet the objectives of the Forestry Law.

To assist in these tasks, SERFOR established the Control Module of the National Forest and Wildlife Information System (MC-SNIFFS) to enable efficient forest administration and contribute to document the legal origin of Peruvian timber in domestic and export markets.

The agency for Supervision of Forest Resources and Wildlife (OSINFOR) was created in 2008 to monitor and oversee the sustainable use and conservation of forest and wildlife resources and environmental services from the forests under exploitation rights granted by the State. OSINFOR is responsible for the implementation of regulations. It operates the Observatory for legal trade in timber.

Summary... *(continued)*

Permanent Production Forests (BPP)

Forests available for sustainable production (timber and non-wood products) were established in 2000 and are denominated Permanent Production Forests (Bosques de Produccion Permanente, BPP). At present about 17.5 million-ha (see Table 1) have been designated as BPPs, defined as: “areas with primary forests where concessions have been adjudicated by the State for the sustainable use of timber and other natural resources in the forests”.

Table 1. Concessions in BPPs by area and modality, in thousand ha, 2024

Total area	(*) 17,525.74
Under conservation	1,366.80
Dedicated to ecotourism	76.60
Timber concessions	6,612.40
Under restoration	30.45
Plantations	1.51
Non wood production	1,095.77
Not currently allocated	8,342.21

(*) as of 2019

Source: SERFOR, 2024

Together, these mechanisms are intended to secure a market-based system for sustainable exploitation of Permanent Production Forests fostering a transparent and efficient process and addressing issues that led in the past to sub-optimal and illegal use of forests resources. Nevertheless, the rational use of forest resources in the country still faces challenges linked to a weak state presence and limited governance problems compounded by poor infrastructure, conflicting interest by stakeholders, persistent illegal actions, and as concluded below, marginal financial competitiveness. The purpose of the analysis is to visualize how a carbon concession regime could be effective in bypassing or addressing some of these challenges. A full assessment of policy and institutional issues is beyond the scope of the study [3].

[3] More detailed information and analysis of the policy and institutional architecture can be consulted at Kometter R., (2019).

Timber Market

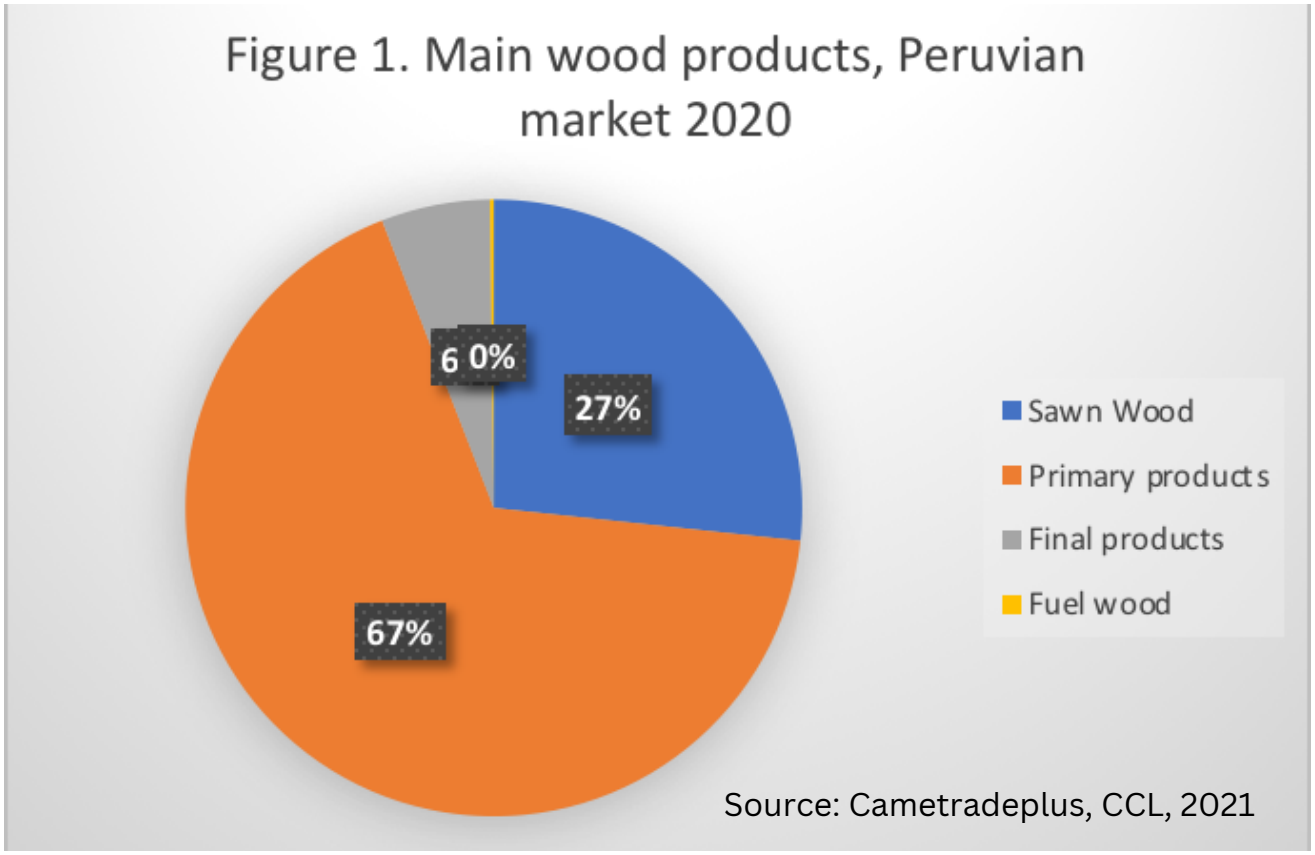
Sustainable timber production is a key intended output of the management of forest resources. In volume, the supply of timber in 2022 (SERFOR, Anuario Annual Forestal 2022, 2023), was about 1.3 million m3, with the most volume coming from a few high-value tropical hardwoods. The corresponding volume of sawn wood from this production was reported at 0.76 million m3. Most of the production comes from the Ucayali, Loreto and Madre de Dios departments in the Amazon region of the county. Two thirds of the supply come from either permits issued in lands titled to indigenous or farming communities (37%), forestry concessions (29%), or non-forestry concessions (19%).

Still, Peru remains a net importer of timber and wood products. Currently, most timber production is consumed domestically, with less than 10% of the total being destined for exports. The demand for timber is estimated at 2.1 million m3 with main products destined to construction, particularly for the housing sector, as well as in manufacturing. Yet, a large share of the wood production in Peru is destined to meet the demand for firewood. In terms of exports, most of the trade is destined to four countries: China, Mexico, Dominican Republic, and the USA. Historically, over 90% of the exports consists of sawn wood and boards, with exports of boards now accounting for 40% (TRNC, 1991).

GIVEN THE SIZE OF THE FOREST RESOURCES IN PERU, THE CONTRIBUTION OF THE WOOD SECTOR TO THE ECONOMY IS RELATIVELY SMALL.

Timber Market *(continuted)*

The timber market is in the hands of the private sector. An analysis (USAID 2021) has concluded that the sector is dominated by informality with a low level of technical training in its labor force, which results in low productivity and poor yields. Its equipment and machinery were found in cases obsolete and/or poorly maintained. The same study also concludes that corruption has been a risk affecting the timber market.



Forestry Concessions

The Government is using forestry concessions to regulate the production of timber in areas designated as Permanent Production Forests. The concessions are usually granted through a public, competitive bid. The grantee is allowed to manage up to 40,000-ha for up to 40 years. Most are relatively small, averaging less than 13,000-ha with only a very small fraction exceeding 40,000-ha. Up to 2022, over 2,100 forestry concessions were granted on 10.1 million-ha (SERFOR, 2022 Anuario Forestal y de Fauna Silvestre, 2023). A growing, but still small area under production has forest certification (FSC), 1.3 million-ha, 90% of which is in forestry concessions.

Impact of Forestry Concessions

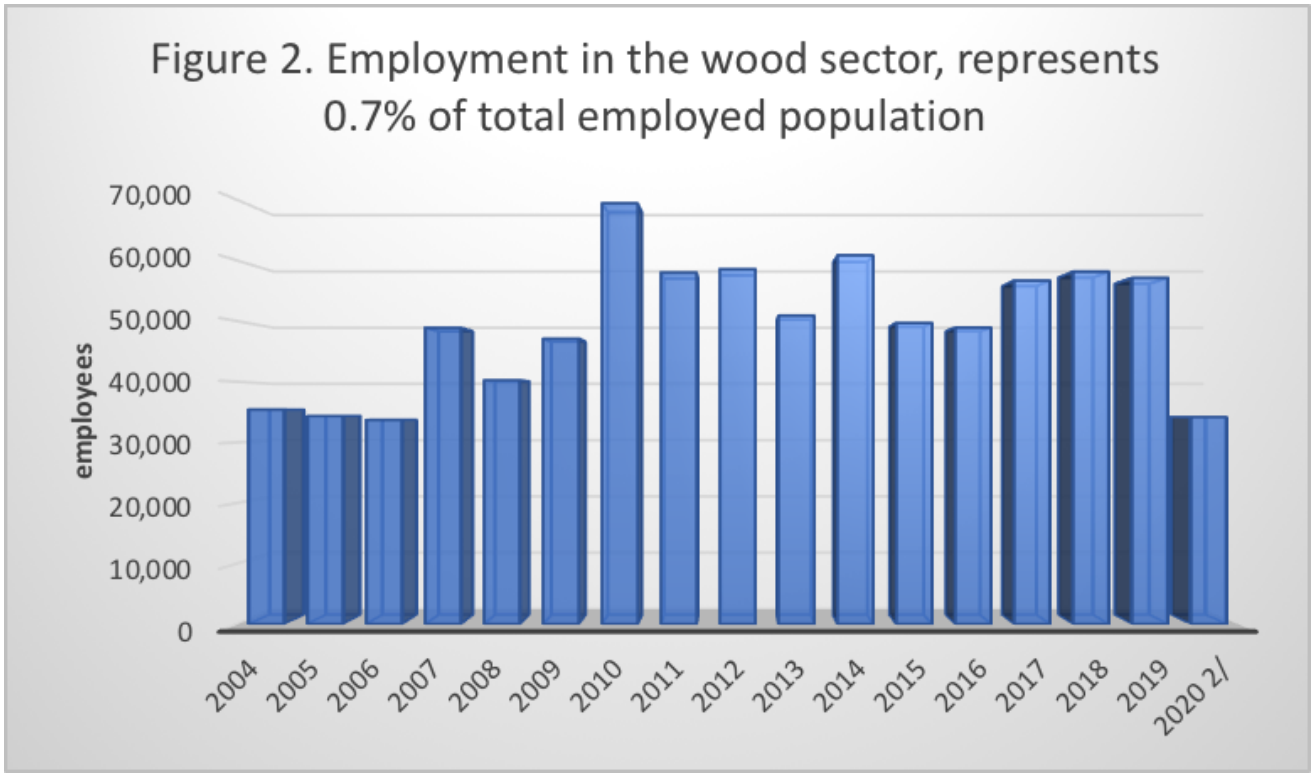
Forestry concessions in Peru have made contributions to employment, GDP, enterprise development, and trade balance. The concessions have also affected the conservation of natural resources in forested areas. This section of the report aims to document these contributions. Government data indicates that only 6.2 million-ha remain under active concessions (SERFOR, 2019). Historically, out the 609 total concessions in place as of 2014 (Finer et al, 2014), nearly 30% were cancelled for violations.

Contribution to Employment

A large share of the labor force in Peru is linked to land use, in particular, Agriculture which had 28% of the total in 2021 (Niel A., Statista, Jan 11, 2024). Forestry plays a role in employment in the economy of Peru through the production of food, timber, construction materials, and other products. The largest part of Peru's forest sector activity is informal. Low productivity, low wages, informal arrangements, and difficult working conditions routinely affect the income and quality of life for those employed in the sector. Still, the employment in the wood sector is estimated to contribute only marginally to the total employment in the nation (see figure 1), fluctuating in between 50,000 and 60,000 jobs during the last decade, or 0.7% of the total sector. There is also some employment generated in ancillary activities to forestry operations such as non-wood products (nuts, herbs, roots); the number of the total employed is likely to be relatively small but also under reported (Cui S., et al, 2022).

Forestry Concessions *(continued)*

Contribution to employment (*continued*)



Source: adapted from data reported in OSINFOR: Reportes estadisticos, consulted, January 2024.

DESPITE PROGRESS IN CLAMPING DOWN ON ILLEGALITY, THE IMAGE PROBLEM OF PERU'S TIMBER EXPORTS PERSISTS.

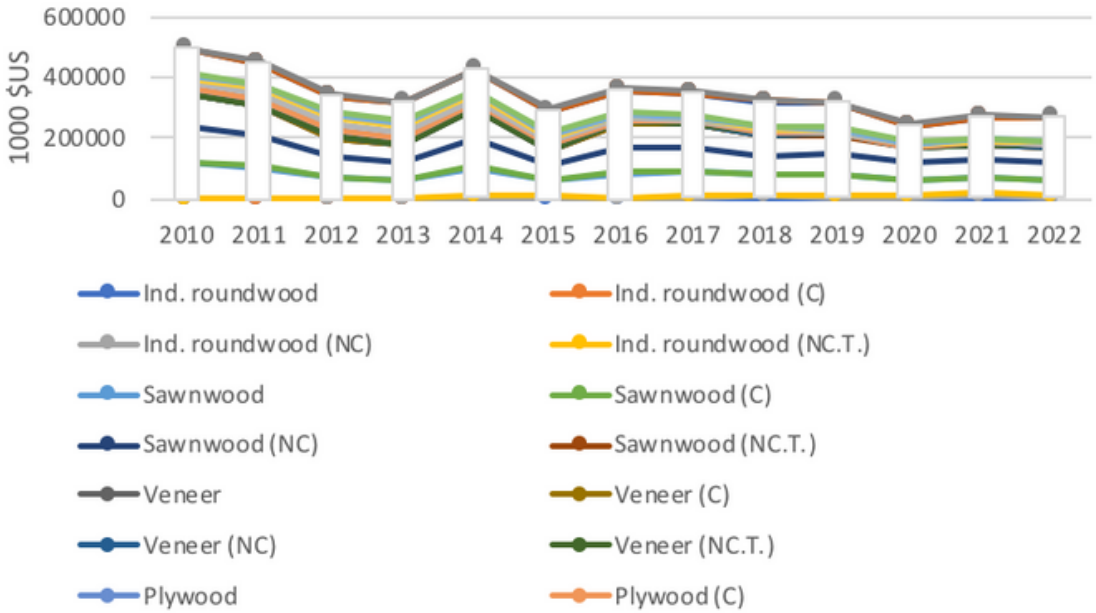
Forestry Concessions *(continued)*

Contribution to exports

The value of exports from Peru in 2021 are estimated at about $56.3 billion (World Bank,2023), most linked to minerals, and the food industry. Timber and other wood products contributed about 0.08% of the total (under $400 million) but its share has been declining over the last two decades (Figure 3). The most frequent species for export include Tornillo (Cedrelinga cateniformis), Ceiba (Chorisia integrifolia), Cedro (Cedrela odorata), Ucuba (Virula sebifera), and others. The largest markets are China, Mexico, the Dominican Republic, and the United States of America.

Illegal timber has been a factor contributing to a reduction of Peruvian timber exports. Recent actions in the European Community and in the US through announcements by the Interagency Committee of Trade in Timber from Peru (USTR, 2023) that the CBP (customs and border protection) will continue to deny entry to illegal logging products from Peru in the US reinforce the issue. Despite progress in clamping down on illegality, the image problem of timber exports from Peru persists. Besides timber, concessions also contribute to production of non-wood commodities. For example, in 2022, Peru exported over 5000 tons of Brazilian nuts, valued at $38 million (Bulletin Agraria.pe).

Figure 3. Timber Export Value Flows from Peru: 0.1% of total



Source: ITTO, 2023, Value of 2021 exports: $56,300 million (Statista 2023)

Forestry Concessions *(continued)*

Contribution to Government Revenues

In addition to taxes on income, forestry concessions pay stumpage fees to the Government. The aggregated fee from forest concessions was $14.6 million in 2021, an average of $1.50/ha-yr. The level of fees is very low compared to global standards (for example, in Canada, the fees are set at $40-$60/m3). In addition, Sawmills established in the Amazon region are exonerated from income tax. On the other hand, the government recognizes a tax credit for exporters, which is estimated at $20 million in 2021 (timber exports get a credit of 4% of the value of exports, but it is scheduled to diminish over time). Therefore, the net contribution to state coffers from fees minus credits was negative in 2021: -$5.4 million/year. However, wood products and manufacture do contribute about $50 million/year through value added and income taxes.

Contribution to Entrepreneurship

There are 250 sawmills legally operating in Peru, most are small scale (averaging 2900 m3/year). However, there seem to be many more sawmills mostly located in the Peruvian Amazon region. In 2017, there were over 26,000 formal companies, including about 10,000 manufacturing companies, working in the timber sector (USAID, 2021), most of which were micro enterprises and less than 1% correspond to medium and large enterprises. SERFOR (2019) also has reported 784 primary transformation centers and 230 warehouses. Recently there has been a substantial reduction in the number of enterprises which has been attributed at least partially with the reduction in exports of timber.

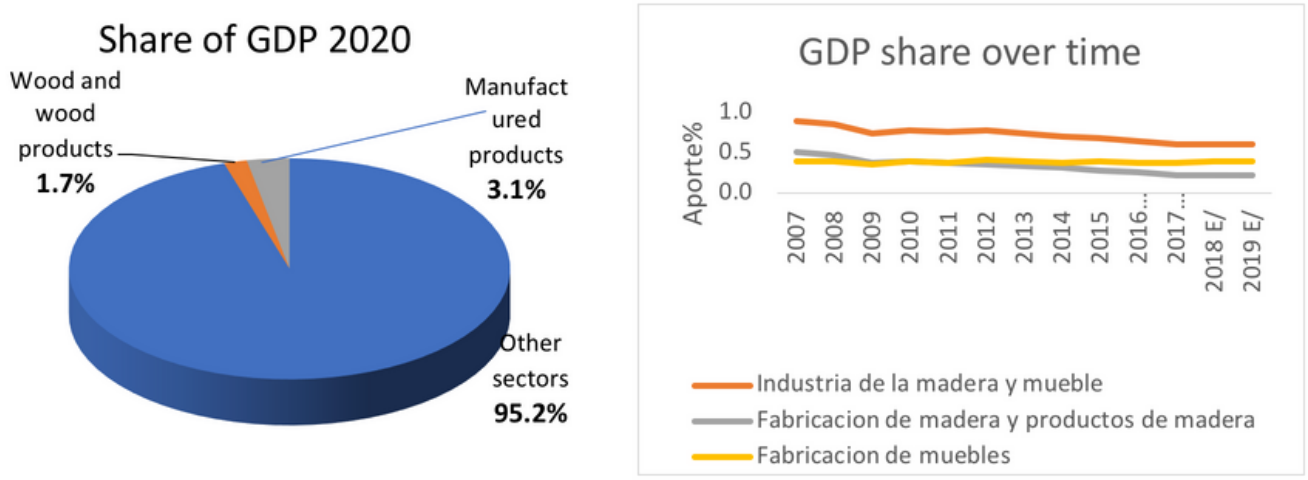
Source: adapted from data reported in OSINFOR: Reportes estadisticos, consulted, January 2024.

Forestry Concessions *(continued)*

Contribution to GDP

Timber extraction and processing has a marginal contribution to the GDP of Peru. SERFOR and the National Statistical Institute (INEI) estimated that in 2019 wood production, including timber, veneers, furniture and other wood-based manufactures contributed 1.0 % to the economy, while the forestry sector (extraction of timber and non-wood products) is estimated to only represent about 0.1% (SERFOR. Cuentas de Bosques del Peru, 2021). This contribution has been decreasing for the last years. The “standard” contribution of the forestry sector to the GDP does not traditionally consider the value of services provided by the forests including water supply and regulation, carbon fixation, biodiversity protection and other services that are more difficult to monetize.

Figure 5. Contribution of Timber and Wood Manufacture to the Economy



Source: Produce.gob.pe

Forestry Concessions *(continued)*

Illegal trade

Illegal timber has affected the Peru forestry sector for many years. A government study (Unidad de Inteligencia Financiera, 2018) concluded that at the time, at least 60% of the timber production in the country was illegal. The Timber Legality Risk Dashboard (forest-trends.org) concluded in 2021 that illegal logging is widespread, and a high percentage of exports are high risk for illegal harvest. In 2021, a government assessment found that in 2015, 37% of the timber had been illegally harvested and laundered into the supply chains (USAID, US Forest Service, 2021). Moreover, the nature of the violations indicates that permits associated with legal concessions were used to harvest trees in unauthorized areas, thus threatening all forested areas. Many of the violations pertained to the illegal extraction of CITES-listed timber species outside authorized areas. These findings highlight the need for additional reforms in support of the goals established under ProREST.

More recently, strengthened efforts by government agencies and better compliance with regulations has reduced the fraction of illegal timber in the market to an estimated 31% of the total, including a reduction of those originating at forestry concessions (USAID, 2022). But there is an increase in illegality in natural areas straddling the border between Colombia, Brazil, and Peru. The value of exports of illegal origin was estimated at $288 million in 2021 (OSINFOR: Statistical Reports). This value is equivalent to about an additional 1% of the GDP.

A concern has also been raised regarding the reporting of timber trade between Peru and importing timber markets (TNRC, 2021). For example, in the case of China, it reported more than double the import values of sawn or chipped wood than Peru reported on exports. These represent a general export over invoicing in the value of exports. This practice could be linked to attempts to access the special tariff regime available to wood exporters in Peru.

Financial Performance of Forest Concessions

In this section, the results of a desk review of financial performance are reported. The analysis includes a comparative financial analysis of a forestry concession with an estimate of revenues and returns and a sensitivity analysis to size of the concession and timber prices in the export market.

Area of the concession

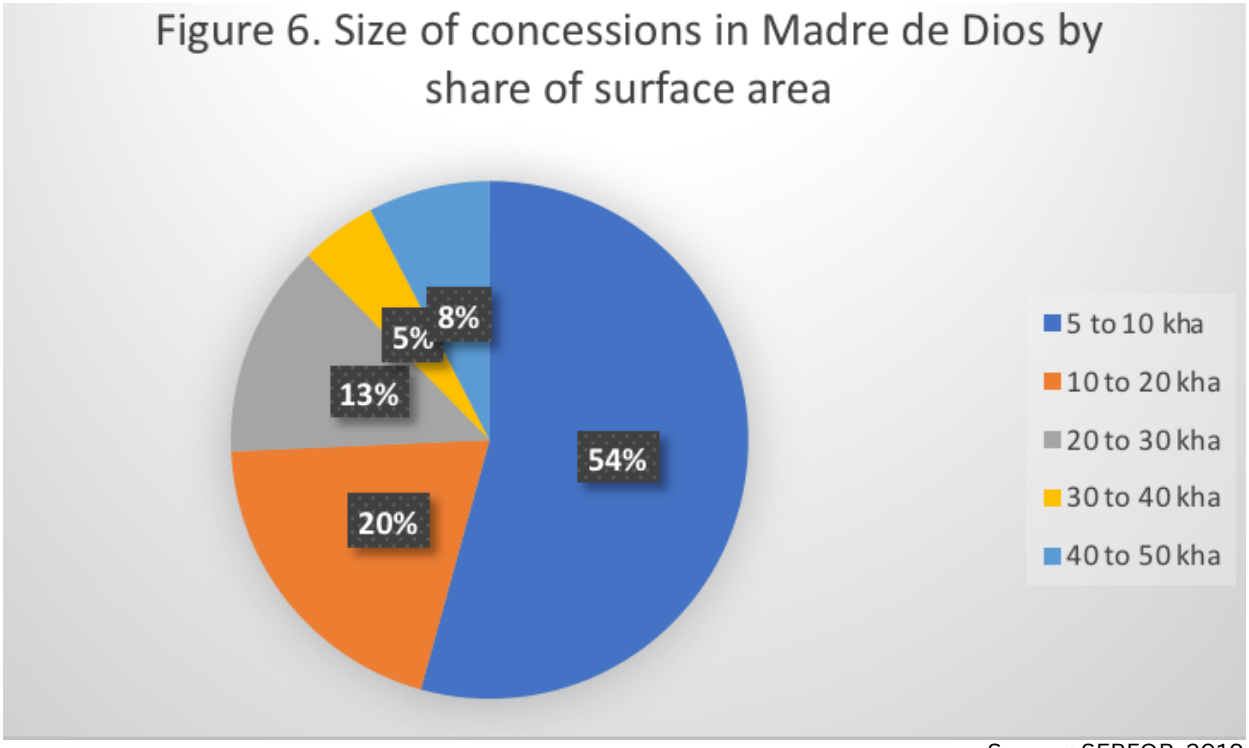
The profitability of forest concessions is very much influenced by the size of the operation. Most of the timber concessions are small. For example, in Madre de Dios, 57% of the surface area under concessions consists of less than 10,000-ha units and 92% are of less than 40,000-ha (OSINFOR: Statistical Reports). An analysis (Kommeter, R., 2019) has shown that small concessions are not profitable and only those that are 40,000-ha or larger are financially attractive. This is most likely the reason why most of the concessions are not active. It might also be one of the reasons why illegal logging takes place, bypassing regulations.

Concessions larger than 40,000-ha capture economies of scale in equipment and can reduce operational costs. For the purposes of this analysis, an assessment of profitability is made for 50,000-ha and 100,000-ha. Concessions at this range of scale may require a modification in existing limits for permits or assume that several concessions group together to gain in economies of scale.

Timber prices

Timber prices have a significant impact on profitability. Most timber production goes to the domestic market, with mostly large concessions dedicated to attend exports. There is a wide price differential between timber prices in both markets. In the domestic market, prices ranged in 2022 between $180 and $240 per m3 of sawn wood, depending on the specific species of hardwood (itto.int/market).

Financial Performance...*(continued)*



Source: SERFOR, 2019

Timber Prices *(continued)*

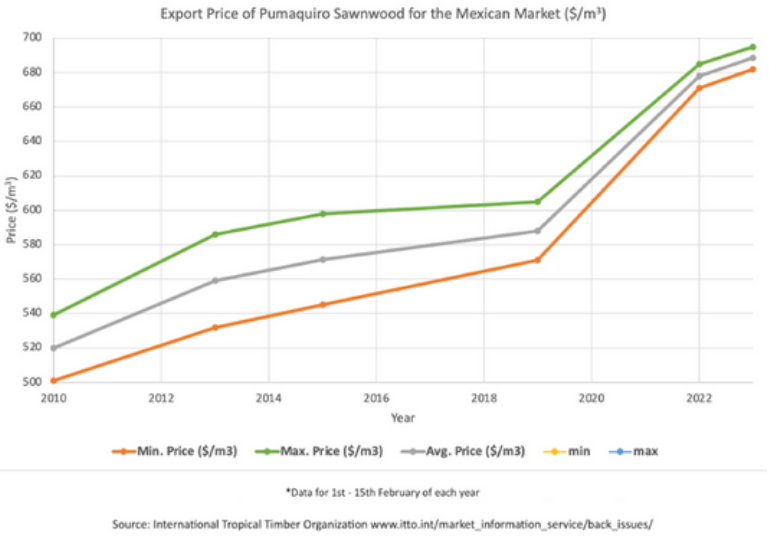
Prices in the international market for Peruvian exports have been increasing over time, perhaps reflecting the increasing difficulty of access to stocks of fine hardwoods in primary forests and the continuing increase in demand in the global market. Efforts at protecting primary forests and limiting access to logging may also result in higher prices. Figure 7 illustrates the gradual increase in prices for Peruvian sawn wood destined to the Mexican market. Most other export markets show similar increases (China, Dominican Republic, United States)[4]. However, the global market for hard sawn wood has remained relatively constant over the period 2005 – 2022, with prices hovering just below $700/ m3 (Statista Research Department, 2023) but commanding a significant premium price over any other products (soft sawn wood, hard logs). Exports to the Dominican Republic are slightly above $700/m3 while those to Asia reach $900 and more per m3. The financial analysis focuses on the export market which commands a higher price. The implication is that producers exclusively marketing domestically will have lower returns.

[4] A discrepancy has been reported between the volumes exported to China and Dominican Republic and those registered at the port of exit in Peru. See: TRNC.1xvr1mwyoh_Topic_Brief_The_International_Links_of_Peruvian_Illegal_Timber_A_Trade_Discrepancy_Analysis.pdf (worldwildlife.org)TRNC Topic Brief. May 2021.

Financial Performance...*(continued)*

Figure 7. Export Prices of Peruvian Sawn Wood

Peru sawnwood, FOB Callao Port	US$ per cu.m
Pumaquiro 25-50mm AD	
Mexican market	682-695
Virola 1-2" thick, length 6"-12" KD	
Grade 1, Mexican market	592-618
Grade 2, Mexican market	507-538
Cumaru 4" thick, 6"-11" length KD	
Central American market	989-1000
Asian market	989-1008
Ishpingo (oak) 2" thick, 6"-8" length	
Spanish market	622-642
Dominican Republic	712-731
Marupa 1", 6-11 length KD	
Grade 1 Asian market	595-615



Source: itto.int/market¬_information_service/back_issues/

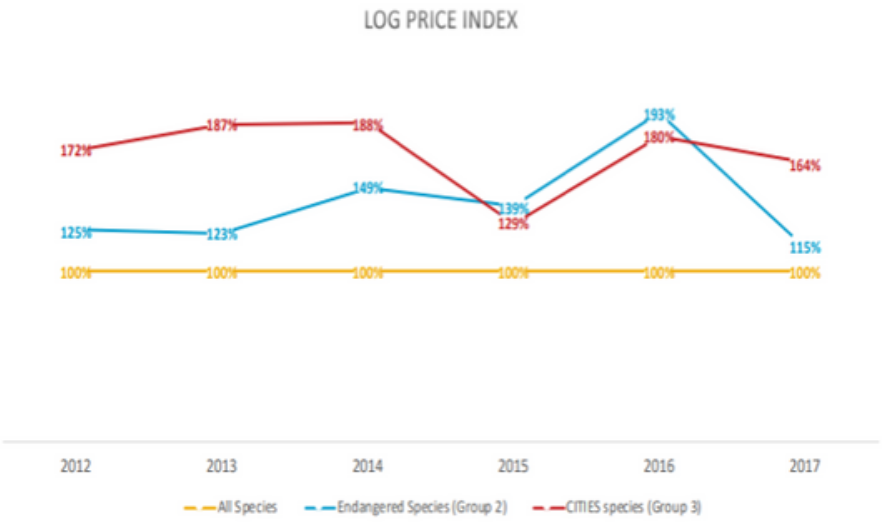
An additional element to consider is the premium that fine hardwoods command on the market. Their extraction drives a lot of logging activity in the tropics and is further linked to activities that escape regulations. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) includes species that are threatened by extinction, are vulnerable and/or endangered. Logging of these species require compliance with the CITES regulations[5]. Examples of species in Appendix 2 includes Mahogany (Switenia spp.), IPE (Ocotea porosa), Rosewoods (Dalbergia spp) (CITES I-II-III timber species manual; cites.org).

Accordingly, and if in compliance with strict regulations, these species command a higher price in the market. Figure 8 illustrates the log price index for species under Appendices 2 and 3, (Symbiosis, 2024) compared with the price index for all other species.

[5] CITES list species under 3 appendixes, Appendix 1 list species are considered the most endangered and are protected from international trade, with trading only allowed in exceptional conditions and only with special permits. Species under Appendix 2 are also protected but trade is allowed under certain conditions.Appendix 3 lists species protected in one country and that country has requested other parties for assistance in controlling trade in those species.

Financial Performance...*(continued)*

Figure 8. Price Index for Logs from All Tropical Species and Species Listed Under Appendixes 2 and 3 of CITES.



Symbiosis, 2024

Yield

The volume of timber extracted by unit area in the concession also has an important impact on profitability. A sustainable yield considers the ability of the forest to recover tree density over the rotation period of the concession. It also depends on the allowable diameter for logging (DMW), established in the regulations and the record of compliance. The yields for timber extraction reported by various concessionaires vary from 15 to 10 m3/ha with a final sawn wood yield of logged timber of between 25% to 30%. For purposes of the analysis the values of 13 m3/ha and 25% to 30% sawn wood yields have been utilized.

To measure profitability, the internal rate of return has been calculated using a benchmark discount rate of 7%. However, in conducting the analysis, an allowance needs to be made to Peru's Total Equity Risk Premium. The equity risk premium represents the additional return that investors demand in a specific country when investing equity. Historically, Peru Total Equity Risk Premium reached a record high of 9.5% and a record low of 5.8%, the median value is 7.5% (www.gurufocus.com). For the purposes of this report the median value has been assumed. Thus in assessing financial viability a benchmark rate of 14.5%, colloquially known as hustle rate has been used for Peru, below which the project would not be financially attractive.

Financial Performance...*(continued)*

Assumptions Used in the Estimate of Profitability

In the analysis the following assumptions have been made regarding a forest concession:

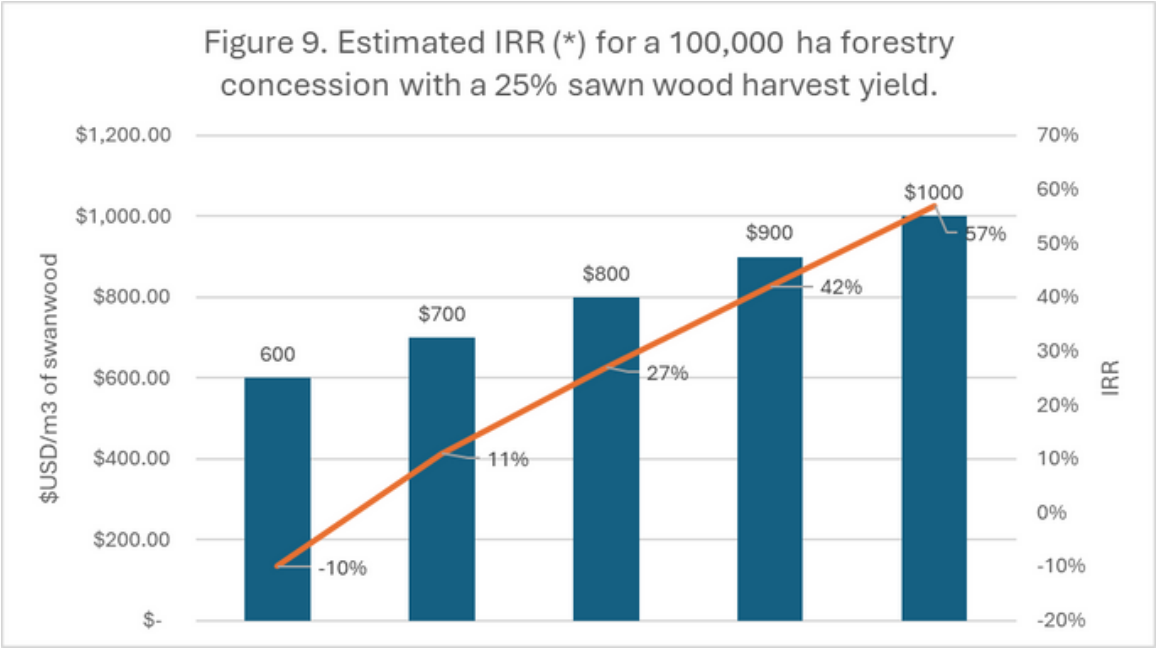
- Undertakes an initial investment to cover the costs of sawmills and ancillary equipment.
- Employs a legal labor force, with payments and benefits reflecting labor regulations in Peru.
- Pays concession fees and adheres to an annual logging plan for 20 years rotation.
- Engages a certification process, registered surveyors, conducts audits.
- Is insured and has legal representation.
- Complies with export regulations.
- It benefits from tax exemption status on profits (located in the Amazon region).
- Costs of transport to FOB port:
- Discount rate: 7%; Premium equity rate: 7.5%; Hustle rate: 14.5%[6]

Estimated Impact of Price of Exports

The IRR was estimated for a 100,000-ha concession, using an estimated value of initial investment to cover the costs of the sawmill and ancillaries as reported by R. Kometter (Kometter, R., 2019) adjusted for capacity as well as one year of operation costs. The timber price in the export market was varied from $600/m3 to $1000/m3. The result is presented in Figure 9. At $700/m3 the IRR is estimated at 11%. At $800/m3, the IRR is 27% well above the hustle rate for Peru (14.5%). The $800/m3 roughly coincides with the estimated market price for fine hardwood species under Appendix 3 of CITES. The estimate shows that at current export prices, the IRR is just attractive and a slight shift upward in market prices would have a noticeable effect on financial performance. The results also seem to indicate that production of timber for the domestic market is not financially attractive.

[6]The hustle rate is the premium over the opportunity cost of capital used to justify investment in aa specific market. Historically Peru's equity risk premium has had a median value of 7.5% (gurufocus.com). Total equity risk premium starts with a mature market premium and adds a country risk premium based on the risk of the country in question.

Financial Performance...*(continued)*



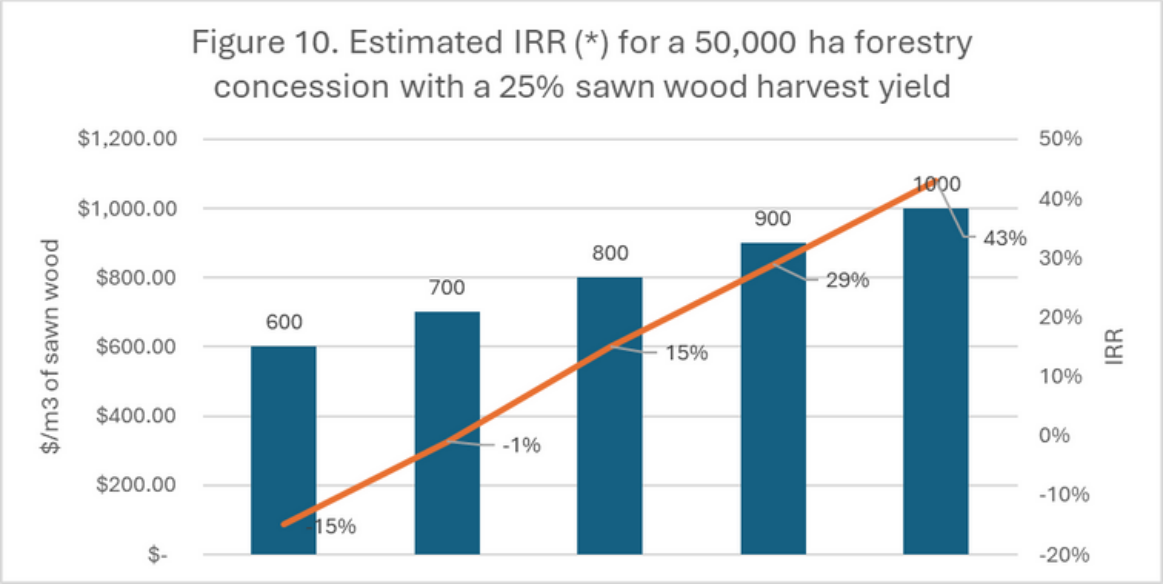
(*) The estimate uses the capital outlays as described by Kometter, R., 2019, adjusted for scale and inflation. It uses a harvest of 13 m3/ha and a yield of sawn wood of 25%. It bases the estimate for operation costs (harvest, transport) on data from existing forest concessions in Peru.

Estimated Impact of Area of Concession

Previous analysis has shown that small concessions, with an area under 40,000-ha are not financially profitable in Peru. This analysis includes estimates for 50,000-ha and 100,000-ha. There are already some concessions in Peru that are at or exceed the 100,000-ha area, and these are amongst the most successful so far.

The IRR estimates for 50,000-ha at different timber export prices are included in Figure 10. The analysis shows that at this scale the concession needs a selling price of timber of about $800/m3 to remain just financially attractive.

Financial Performance...*(continued)*



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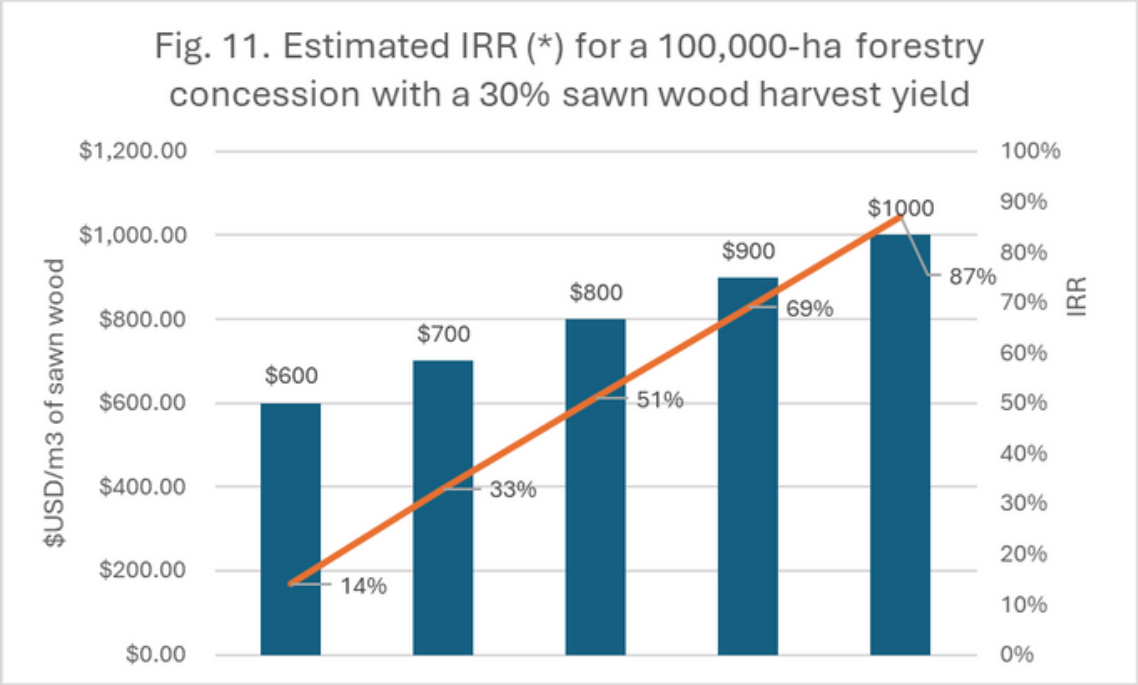
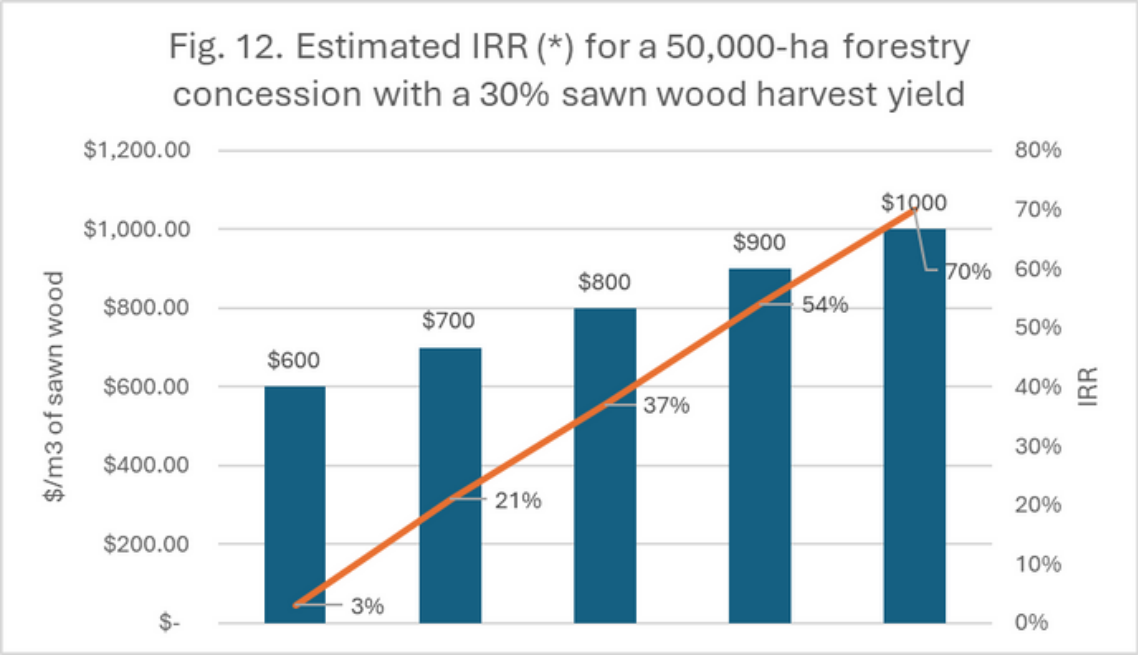
Impact of Yield

Being able to increase yield to 30% by reducing wastage in the logging operation and maximizing the production of sawn wood has an important effect on profitability. These improvements, however, are only expected to be achieved by those concessions with access to better machinery and skilled labor. The IRR estimates for concessions able to achieve these yields are presented in Figure 11 and 12. Under these conditions, profitability at $600/m3 is already achieved at 100,000-ha concession. At the 50,000-ha size, the operation is profitable at export prices of $700/m3.

Financial Performance...*(continued)*



(*) The estimate uses the capital outlays as described by Kometter, R., 2019, adjusted for scale and inflation. It uses a harvest of 13 m3/ha and a yield of sawn wood of 30%. It bases the estimate for operation costs (harvest, transport) on data from existing forest concessions in Peru.



(*) The estimate uses the capital outlays as described by Kometter, R., 2019, adjusted for scale and inflation. It uses a harvest of 13 m3/ha and a yield of sawn wood of 30%. It bases the estimate for operation costs (harvest, transport) on data from existing forest concessions in Peru.

Summary

The analysis confirms findings reached by other studies that forest concessions in Peru, under current conditions are only financially attractive at larger scales than those prevalent today under the forest concession framework. Furthermore, it seems unlikely that profitability can be reached for those concessions attending just the domestic market for timber at current prices and logging conditions. The finding explains partially why so many small concessions have been abandoned. It may also explain why illegal activity skipping regulations on rotations, minimum diameters, and logging of species under CITES appendixes continues in place.

One bright spot is the expectation that timber prices in global markets may resume/continue their gradual increase, driven in part by relative scarcity of fine hardwoods. However, higher prices might also continue to promote illegal logging activities in Peru. Therefore, urgent additional attention and enforcement actions are required so that the market can only be accessed by those actors that follow the law and regulations drawn to ensure that forest exploitation is sustainable in the first place.

Carbon Concessions

An alternative use of Permanent Production Forests, based on revenues derived from the carbon markets has been reviewed. A carbon concession replaces timber extraction with the maintenance and improvement of carbon stocks in standing vegetation. The objective of the concession is therefore to maintain the forest in the concession preventing its logging or degradation. Under a carbon concession, the revenues result from the maintenance of the carbon in standing biomass and enhancement of stocks, as trees that otherwise would have been harvested will continue absorbing carbon. A carbon concession would not need to invest in a sawmill, other machinery, or infrastructure associated with logging nor would it be incurring in harvesting and transport costs of timber to the market. On the other hand, it would not employ as large a labor force as that required for a logging operation or generate as much economic activity.

As the revenues from a carbon concession would come from the welfare of the standing forest, there is a strong incentive to maintain its integrity. Bypassing logging in areas under well-governed carbon concessions contributes to eliminate risks currently associated with illegal logging and would assist in maintaining other ecosystem services linked to undisturbed primary forests.

There are a few examples of carbon concessions already in operation in the neo-tropics which could be reviewed for their experience and performance. An emerging market for forest carbon is in Brazil, where a new law (Forestry Bill) approved in 2023 allows companies with forestry concessions to generate carbon credits. One concession established with the purpose of conserving the forest and generating carbon credits from conservation efforts has been established in Rio Cautario in the State of Rondonia on public land being threatened by gradual deforestation and encroachment. A de-facto carbon concession has also been established by Green Gold Forest in Peru, based on an existing forestry concession being converted into a carbon concession. Table 2 below summarizes some key features at both concessions, that may be of relevance for future carbon concessions in Peru.

Carbon Concessions *(continued)*

Table 2. Main Characteristics of Carbon Concessions at Rio Cautario (Rondonia, Brazil) and Green Gold Forest (Loreto, Peru)

Parameter\Concession	Rio Cautario	Green Gold Forest
Size (ha)	146,400	186,000
Duration (years)	30	20
Community benefits	Created Environmental Services Scheme (PES) now paying 88 families a monthly stipend of US$ 238. This has provided greater financial stability to families reliant on subsistence agriculture. In addition, once revenues are generated from the sale of carbon, the communities will receive an additional share of the net revenues.	Community fund
Method to estimate carbon credits	REDD+	Improved Forestry Management
Training	Training on native tree seed collection as part of this programme. Training for monitoring and firefighting.	Training and capacity building in monitoring and vigilance.
Revenue sharing	Concession shares profits (50%) with the regional and state authorities and local communities.	Concession pays fees established by MIDAGRI on forestry concessions.
Status of approval by the VCM	PDD in preparation. It may be affected by changes in the methodology for REDD + projects.	PDD completed and submitted under revised methodology.

Carbon Concessions *(Continued)*

Carbon Market

The revenues for carbon concessions are dictated by the terms of the carbon market. The carbon market for land-based emissions is structured under the Voluntary Carbon Mechanism (VCM). It basically allows an emitter to compensate their unavoidable emissions by purchasing carbon credits. In the VCM, credits trade on a voluntary basis. Currently, it is a decentralized and fragmented market, dominated by independent standards, including the Verified Carbon Standard (VCS), the Gold Standard (GS)[7] and others.

Of these, the VCS is the largest and has the longest history and the most land-based projects [8]. Forestry carbon projects constitute the largest cohort under the VCS. For forestry, there are three types of projects that can be credited for carbon reduction: avoided deforestation (REDD+), Forest Restoration (Afforestation/Reforestation) and Improved Forest Management (Table 3).

Table 3. Carbon Crediting Methodologies Available for Forestry-related Projects

Project type	Registry	Scope	Applicability
Avoided Deforestation (REDD+)[9]	VM0007	Preventing deforestation and forest degradation.	Forest lands that would be deforested or degraded in the absence of the project activity.
Forest restoration (afforestation/reforestation)	VM0047	Creates or restores forest cover.	Activities that increase the density of woody vegetation in project areas.
Improved forest management	VM0010/ VM0045	Forest management is altered to increase carbon storage in the forest (longer rotation, reduced logging, or increasing conservation areas).	Wide range of improved forest management practices. The focus is on estimation of GHG emissions and or carbon stock change on permanent plots.

Source: VERRA.org

[7 & 8]The largest independent crediting mechanism is the Verified Carbon Standard (VCS), followed by the Gold Standard, the American Carbon Registry, and the Climate Action Reserve. These are all compliance schemes that use independent systems as a source of credits

[9] This methodology will expire soon and the consolidated REDD+ methodology will be used.

Carbon Concessions *(Continued)*

To get accredited under the VCM, forestry projects need to show additionality (without the action taken by the project, the removal or reduction would not take place) and permanence (the removal or reduction would remain in place over time). On both counts, forestry projects, in particular those that use REDD+, have faced criticism [10] and this has contributed to keeping the prices in the VCM low. As a result, the price gap between carbon markets operating for other sectors (energy, industry) and land-based projects is considerable, reaching at times an order of magnitude [11].

Figure 13 illustrates the current disparity between prices for carbon in the European Union Emission Trading System (EU-ETS) and for land-based projects in the voluntary market. In the VCM the price is currently around $1.60/ton CO2 and reached $1.85/ton CO2 at the start of 2024 vs €53/ton CO2 in the EU-ETS. Several analysts have indicated that the VCM could expand rapidly, and prices improve if concerns about the integrity of land-based emission reductions/removals are satisfactorily addressed (Deloitte.com/us/en/insights/) and a global governance structure as advocated in Article 6 of the Paris Agreement is adopted (more on this below). The ability to demonstrate additionality and permanence of land-based projects are essential to reach said stage.

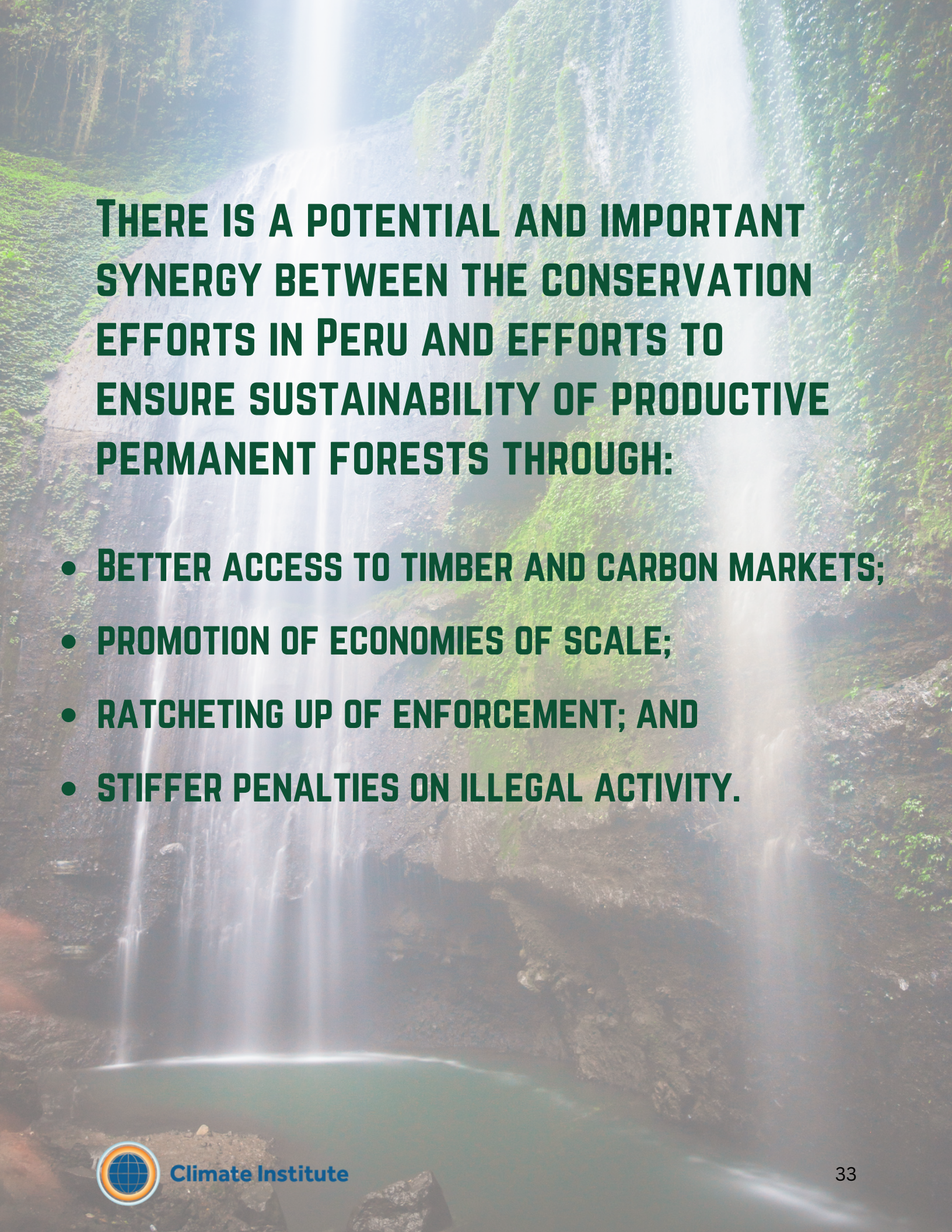
[10] An analysis released in 2021 by The Guardian Newspaper and Unearthed found the Verra's VCS was flawed and this has led to lengthy delays in the accreditation process for affected projects.

[11] Nevertheless, some high-quality projects in the over-the-counter market have maintained profitable prices for REDD+ projects, higher than standardized contract prices.

Carbon Concessions *(Continued)*

Figure 13. Carbon Pricing in the EU-ETS Market and for Land-based Emission Reductions or Removals in the VCM

Source: carboncredits.com/carbon-prices-today
consulted March 2024



There is a potential and important synergy between the conservation efforts in Peru and efforts to ensure sustainability of productive permanent forests through:

- Better access to timber and carbon markets;
- promotion of economies of scale;
- ratcheting up of enforcement; and
- stiffer penalties on illegal activity.

The Future of the Carbon Market

As controversies over the integrity of land-based carbon credits have affected the volume and prices in the voluntary market, corrective measures have been proposed to address the various criticisms raised. The fact remains that sound methods to measure and credit the contributions of land-based actions to reduce/remove emissions are part of the long-term solution to achieve stabilization and reduction of CO2 emissions. Land based emissions are after all a key component of overall emissions in many countries.

To address the reputational and compliance risks in the land-based voluntary carbon market, projects need to clearly address the following criteria:

Additionality: reduction/removals in land-based projects have to represent a verifiable change that would not have occurred without the carbon credit revenue.

Permanence: reduction or removal should be maintained over time without being reversed.

No damage: reduction/removals should contribute to social or environmental benefits, without damage or costs. On this last point, a greater recognition of the links between climate and biodiversity and the role that land based climate actions could have on biodiversity protection is required.

Leakage: an action causing emissions reductions in one place should not cause increases elsewhere.

The VCM is still in its initial stage. The criticisms made to some of the standards should be seen as part of the strengthening process required for the market to reach maturity. This does not mean that countries like Peru ought to refrain from participating and probing the market. Table 4 summarizes some steps being taken to address the weaknesses of the current system. If these steps are successful, the market value and volume of the VCM will both increase.

The Future... *(Continued)*

Table 4. Strengthening the VCM

Issue	Actions seller	Actions purchaser
Loose carbon standards lead to reduced credibility. Deficient methodologies or their weak application leads to untrustworthy results.	The Integrity Council for the Voluntary Carbon Market (ICVCM) has developed criteria with increasingly stringent 'core carbon principles' that aim to ensure a carbon credit is high integrity in terms of its environmental, climate, and social performance.	The Voluntary Carbon Markets Integrity Initiative (VCMI), has been organized, aiming to help buyers through the process of purchasing high integrity carbon credits
Science-based targets too open to interpretation	Clearer science-based targets will assist sellers seeking to secure validation for their net zero emissions targets.	Buyers will reduce risks when clear science-based targets are linked to specific transactions.
Availability of high-integrity carbon credits	Land-based carbon removal projects are seen as one of the most reliable forms of carbon credits, as these actually remove carbon from the atmosphere.	Buyers need to look at nature-based projects more as long-term investments rather than as means to a transaction. This will strengthen the market for land-based removals/reductions and help ensure permanence.
Availability of investments	Land-based carbon removal projects offer one of the most competitive avenues for investment in carbon credits. Identification of a portfolio of projects, with clear standards and high integrity will attract investments	There is capital available for the right projects and the urgency of action is not diminishing over time.

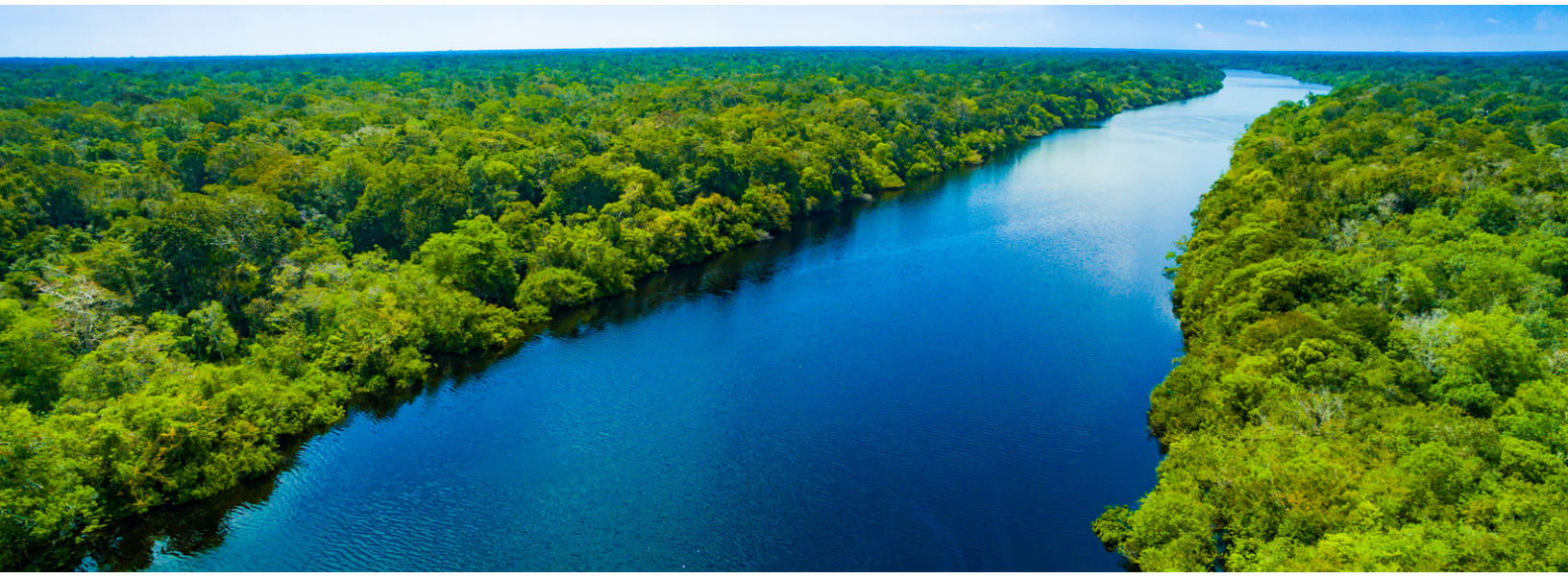
Source: adapted from VERRA.org

As noted above, the current market for nature-based carbon credits is under pressure, pending wide adoption of robust standards. More rigorous definitions of quality and greater emphasis on carbon removal could solidify market confidence, lift prices, and drive demand (Bloomberg NEF, 2024). Bloomberg expects a $20/t CO2 price by 2030 in the carbon offset market (Carbon Market Outlook, 2024) once these concerns are addressed.

The Future... *(Continued)*

Even now, segments of the market outperform current pricing. For example, some high-quality projects in the over-the-counter market have maintained profitable prices for REDD+ projects, as opposed to standardized contract prices; and several projects that generate removal credits are still commanding higher prices [12]. High quality nature-based carbon projects that clearly demonstrate additionality and permanence command a premium in the market. The premium is not easy to define ex ante, but some analysts point to a 3-4 times willingness to pay for high quality carbon projects (BCG, 2023).

For purposes of this analysis, a price range of $6 to $8 /ton CO2 equivalent has been adopted, assuming that carbon concessions will be able to demonstrate: clear additionality (replacing logging with maintaining carbon stocks); permanence (obtaining concession periods of 40 or more years); cause no damage, by guaranteeing the integrity of the forest and its services; and result in no substitute forest concessions to replace those that transition to carbon concessions. For forestry concessions that migrate to carbon concessions, in other words that avoid logging, the best fit is the Improved Forest Management option [13] .



[12] Credits from Katingan project in Indonesia, a REDD+ initiative, have remained largely stable at a time when the REDD+ segment of the voluntary carbon markets is witnessing sharp reductions, quoting at $5 to $6 /ton CO2 equivalent (S&P Global, 2024).

[13] Using the Improved Forest management option also avoids controversies regarding REDD + projects and the complications associated to the applications of the national baseline for emission reduction purposes. In fact, recently MINAM has announced a new national base line that by some estimates would significantly reduce the claims of avoided deforestation. The new baseline may become effective by 2025. REDD + projects need to meet Jurisdictional and Nested requirements (Verra JNR requirements Version 3).

Projected Financial Performance of Carbon Concessions

The study includes a financial analysis of carbon concessions in Peru, borrowing from data and experience from existing carbon concessions. To provide a basis for comparison, the carbon concession is estimated on a 100,000-ha area. The concessions are taken to operate at existing forestry concessions to facilitate an assumption of avoided logging. In assessing financial viability a benchmark rate of 14.5%, colloquially known as hustle rate has been used for Peru, below which a project would not be financially attractive.

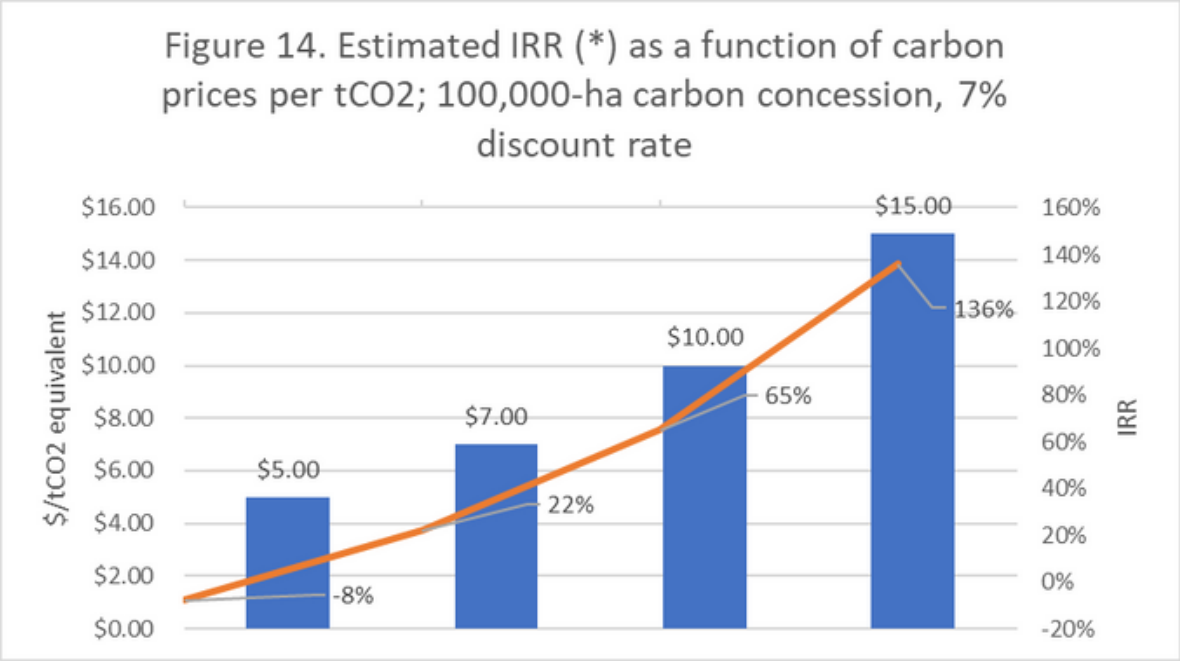
Assumptions Used in the Estimate of Profitability of Carbon Concessions.
In the analysis the following assumptions have been made regarding the carbon concessions:

- Revenues based on the current conditions of the VCM market.
- Market price $7/ton CO2 equivalent, reflecting high-integrity carbon avoidance credits.
- Employs a smaller (1/6) labor force compared with forest concessions, with payments and benefits reflecting regulations in Peru.
- Pays concession fees and reflects an avoided logging plan for 20 years rotation.
- Argues avoided logging as the basis for additionality. Commits to a 40-year minimum concession term, to address permanence issues.
- Engages a certification and monitoring process.
- Is insured and has legal representation.
- It benefits from tax exemption status on profits (located in the Amazon region).
- No costs of harvesting, industrialization or transport
- Discount rate: 7%; Premium equity rate: 7.5%; Hustle rate: 14.5%.
- The estimate of avoided emissions is based on the carbon content of the timber not logged, the passive accumulation over time of carbon in the plots not logged and the carbon in the standing biomass lost during logging but not harvested.

Projected Financial Performance *(continued)*

For purposes of the analysis, a value centered on $7/ton of CO2 equivalent has been adopted on the basis of forest concessions providing high-integrity credits [14]. Yet, it is recognized that even slight variations in price have an oversized impact on the financial profitability of carbon concessions.

The results of the analysis are presented in Figure 14. Under the assumptions used, a 100,000-ha carbon concession with revenues estimated at $7/ton CO2 equivalent would be financially attractive. At $6.0 per ton the project is just marginally competitive. A carbon market price of $10/ton CO2 equivalent would result in a very financially attractive operation.



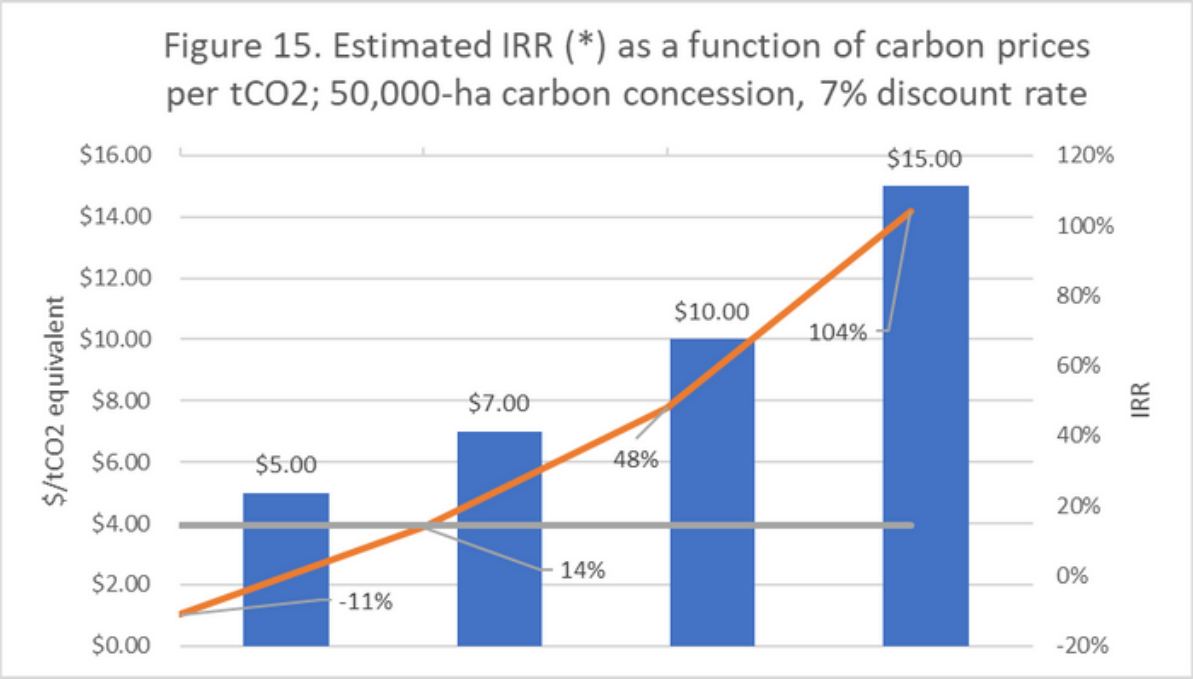
(*) The estimate uses an avoided logging of 13 m3/ha and the UNFCCC default factor for carbon content in hardwood of 0.5. It also assumes 50% moisture in freshly logged timber. It bases the estimate for operation costs (harvest, transport) on data from proposed carbon concessions in Peru. In calculating carbon emission reductions, an allowance was made for passive growth in unlogged parcels and for the avoided induced destruction of standing biomass during the process of harvesting and accessing (1.5 m3/ha logged). The residual value of the sawmill and other equipment is small given the age of the concessions and their size and therefore is not accounted for. The hustle rate is estimated at 14.5%.

[14] This is still a historically low value caused in part by the recent and valid criticisms of some of the methods and standards in use.

Projected Financial Performance *(continued)*

Carbon concessions carry relatively high fixed costs linked to the development of the PDD [15] and the costs for monitoring and verification. Accordingly, the scale of the concession has a significant impact on the profitability of the carbon concession.

Figure 15 illustrates the results of the analysis when the concession area is 50,000-ha. At $7/ton CO2 equivalent the operation would yield returns just at about the hustle rate for Peru.



(*) The estimate uses an avoided logging of 13 m3/ha and the UNFCCC default factor for carbon content in hardwood of 0.5. It also assumes 50% moisture in freshly logged timber. It bases the estimate for operation costs (harvest, transport) on data from proposed carbon concessions in Peru. In calculating carbon emission reductions, an allowance was made for passive growth in unlogged parcels and for the avoided induced destruction of standing biomass during the process of harvesting and accessing (1.5 m3/ha logged). The residual value of the sawmill and other equipment is small given the age of the concessions and their size and therefore is not accounted for. The hustle rate is estimated at 14.5% (horizontal line)

[15] PDD is the project design document that includes the calculations for the emission reductions/removals, business plans and steps for implementation. It is frequently contracted out by the project proponent and requires of extensive documentation to comply with the requirements of the voluntary market.

Projected Financial Performance
(continued)

Independent of the relative financial advantages of carbon concessions, these concessions could have an impact on illegal logging, increasing the governance as all revenues depend on the ability to maintain the trees on the ground. Also, a standing forest will deliver additional benefits in terms of biodiversity conservation and the maintenance of other environmental services provided by the forests.

A forestry concession could allocate a fraction of the concession's area to carbon emissions avoidance by foregoing the right to log. The area not logged would have to remain not logged for the terms of the concession and any extensions, to be able to claim permanence. Also, if the area is originally targeted for logging it would meet prima facie the test of additionality. If the total area of the concession remains at 100,000-ha and half is dedicated to logging while the remaining for carbon business, the concession would underperform when compared with 100,000-ha concessions dedicated to either. The concession would not have flexibility to switch products in answer to vagaries of the markets. Doing so would negate the rational for additionality and permanence. To achieve similar economies of scale a hybrid concession would require an area of 200,000-ha.

Table 5. Comparing the Impact of Carbon Concessions Compared to Forest Concessions in Permanent Production Forests.

Issue	Carbon Concession
Financial profitability under current market conditions	Marginally better even at current historically low carbon prices.
Labor force	May employ one sixth of the labor force of a forest concession on a 100,000-ha area.
Investment Required	Does not require machinery nor access infrastructure. Investment is required only for governance and vigilance infrastructure at a fraction of the cost of investments for forestry concessions.
Conservation of ecosystem services	Integrity of the primary forest is ensured under a well governed concession.
Illegal logging	As logging does not take place, illegal activity is more difficult to hide.

Article 6 and its Impact for the Carbon Market in Peru

The article 6 of the Paris Agreement permits countries to voluntarily cooperate to achieve emission reductions targets. When fully in force, it will allow countries to trade carbon credits under an international compliance mechanism governed by the rules of the Paris Agreement. Once approved, Peru would be able to directly sell carbon credits gained through domestic reductions and removals, such as those secured through the operation of carbon concessions. The central point of Article 6 is the Corresponding Adjustment, meaning assuring that no double counting results when carbon debits or credits are exported.

Article 6 also points to the development of a global carbon market. Its adoption is expected to stabilize markets and drive demand. As prices, markets, and the standards evolve over time, individual actors and countries need to review positioning strategies to ensure the best possible access to markets while maintaining compliance with standards. Its implementation will require standards for certifying credits, a registry for transfers, and a market for facilitating such transfers.

In the context of the current carbon footprint of the nation, the provisions of the Paris Agreement under Article 6 would only be beneficial once Peru reaches and surpasses its own goals (expressed in the NDCs [16]). At that juncture, removals/reductions from carbon concessions may be quite competitive in the international market. Until the Article 6 provisions are approved any of the credits covered by these markets are still to be accounted for by the producing or purchasing country in their NDC calculations. It could be that Peru decides not to include forestry concessions that migrate into carbon emission avoidance activities in the national baseline. Under such a scenario, emission avoidance caused by these activities could be available for trade in the international market.

[16] Nationally determined contributions (NDCs) are at the center of the Paris Agreement and the achievement of its long-term goals. NDCs represents the goals by each country to reduce national emissions and adapt to the impacts of climate change. The Paris Agreement requires each Party to prepare, communicate and maintain successive nationally determined contributions (NDCs).

Adjustments to the Regulatory Framework

On paper, the current regulatory framework allows for carbon concessions, as carbon removals or reductions can be seen as one of the non-wood products considered in the law. To make good on the potential for use of carbon concessions in the country, some clarifications in the regulatory framework may be required:

For example, the ability of forest concessions to avoid logging altogether and instead focus on its productive management as carbon sinks and stocks should be clarified. This will entice more actors to consider participating in the market.

The level of penalties for engaging in illegal timber extraction should be increased. The costs to the economy, market participants, and local communities of illegal logging is too onerous. An increased level of fines and penalties will promote better compliance.

A clear and transparent bidding process for carbon concessions could be adopted requiring proven expertise in the management of forests and a history of successful engagement with local communities.

Given the low level of expertise and skills of the labor force, a technical assistance program could be structured aimed at increasing knowledge and improving practices associated with monitoring and verification of carbon stocks in concessions.

Likewise, training is required for entrepreneurs and stakeholders on the application of methodologies approved under the VCS.

Learning from the process of approval of forestry concessions, a streamlining of the approval process would be beneficial, with an emphasis of ensuring additionality and permanence of the proposed carbon removals/reductions.

Eventual carbon concessions would need to originally be established as forestry concessions to ensure that the additionality criteria is met.

Finally, while it is expected that carbon concessionaires will work to avoid illegal logging as it eats into their revenues, the vigilance mechanism of the State needs to oversee those efforts.

Plantations

To the extent that carbon concessions are able, under market conditions, to operate on some of the timber concessions, timber availability for domestic use and exports may be affected. Plantations of hardwoods demanded by these markets could eventually substitute the displaced timber production from primary forests. Well-planned plantations could also meet the land restoration goals established under ProREST [17] if these take place on degraded land.

Tree plantations can also be instrumental in reducing degradation of primary forests by illegal loggers as the species most required for the market could be produced at scale and probably at lower costs. Further, plantations can also reduce the need for BPPs to be used for timber that instead could be dedicated to the production of non-wood products.

A study on the subject by CIFOR [18] found that Forest Plantations in Peru have not progressed in area during the last few decades and in general have not contributed in a meaningful way to meet the demand for wood in the domestic and export markets. In addition, a lot of the experience with plantations in Peru has been the result of work with exotic species, while Peru has one of the largest numbers of forest species in the world. CIFOR study also concluded that there is a need for: the identification and analysis of business models for plantations; improving the availability of qualified labor and applications of standards and methodologies for plantation operations; improving the availability of technical and regulatory information to facilitate the planning and decision making by the private sector.

[17] Peru is working to meet its commitments made in the context of Initiative 20x20, by restoring 3.2 million hectares of degraded land. Since 2015, it has been receiving related support from FAO's Forest and Landscape Restoration Mechanism (FLRM). Early in 2016, and building on targeted FAO support for forest and landscape restoration (FLR), Peru's National Forest Service (SERFOR) began developing a proposal for the creation of a National Programme for the Recuperation of Degraded Lands (PNRAD).

[18] CIFOR estimates that about one third of the global demand for sawn wood is met by commercial plantations (CIFOR, Las Plantaciones Forestales en Peru, 2017)

Plantations (*continued*)

To address many of these issues, the Government has updated the Strategy for Promotion of Forest Plantations, 2021, 2050 (Plan Operativo Annual 2024, MIDAGRI, 2024). Under the updated strategy, technical assistance activities are identified to promote forest plantations. These include technical assistance by MIDAGRI to:

a) support for the sustainable supply of seeds and the identification of trees able to supply quality and quantity of seeds; b) support for the development of nurseries for the production of genetically sound germplasm; c) support for the development of management and training systems at plantations to enable productive and sustainable operations; and, d) support for the development of efficient harvesting and industrialization methods. All these actions are funded and launched through the implementation of regional technical workshops.

If plantations are to be based on native species, additional issues arise; at least the following need to be considered:

a) the development of protocols for the germination of selected native species; b) a harvesting and selection process to use the best genetic material; c) the lack of knowledge on the growth and maturation processes of native species. All of these factors will increase the costs and times associated with native plantations.

The likely financial performance of plantations based on native species has been examined based on relevant actual experiences in the region. While there are a few thousand hectares in plantations in Peru, there are only quite limited experiences with native species in plantations.

One example is the LXG pilot project on 600 hectares in Madre de Dios converting deforested areas into “Organic Food Forests” combining cash crops with precious native timber plantations. LXG considers the right model to do reforestation in Peru is silviculture of precious native timber that do not require agrochemicals with intercropping to achieve a net zero cost of reforestation and enhance the growth of the precious timber. LXG reports that the income from organic intercrops covers the maintenance costs of the plantation.

Plantations (*continued*)

In Brazil, the Symbiosis project [19] is one of the best examples of the business of plantations with native species. The project focuses on species in the CITES appendixes 2 and 3 and other vulnerable precious woods. The geographical focus is the region of the Mata Atlántica.

The gestation of a native species plantation project is relatively long, especially at the time when the business and awareness of the possibilities is just starting to dawn on investors. In the case of Symbiosis, the project has been in development since 2010 during which time investments were made in the identification of mother trees for the provisions of seedlings for 55 native species.

Most of the experience with plantations relates to exotic species. The protocols for germination and growth of native species are still limited. A number of entities in the region have however advanced in the development of suitable protocols. One example is MASBOSQUES (masbosques.org) in Colombia, which has successfully developed and deployed protocols for the planting and recovery of the population of several native species [20].

The study includes a financial analysis of a plantation with exclusively native species in Peru, borrowing from data and experience from existing experiences in Peru and Brazil. To provide a basis for comparison, the plantation is estimated to have a 30,000-ha area. The plantation is assumed to be located on a parcel of already deforested land.

[19 Symbiosis has an active plantation based on native species in Brazil. The objective of the plantation is to enable the emergence of sustainable hardwood chains and reduce deforestation pressure in the amazon by providing to the market precious hardwoods. Symbiosis provides a genetic ex situ conservation of germplasm for some of the most threatened ecosystem and species in Brazil. It enables biodiversity recovery by planting CITES species in mixed plantations.

[20] Masbosques is an NGO dedicated to the conservation and restoration of forest ecosystems in Colombia. It intends to protect biodiversity and the environmental services provided by forests. Masbosques has led restoration and conservation efforts involving native species, some of which are included in the Appendixes of CITES.

Plantations (*continued*)

The following additional assumptions were used in the analysis:

- IRR to 30 years (not 20)
- Major upfront investment in infrastructure and equipment for seed collection, germination, greenhouses, genetic selection and operational costs linked to harvesting, transport and industrialization.
- Thinning schedule (after Symbiosis project in Brazil):

Year	Yield (m3/ha)	Total timber production (m3)	Sawn wood (m3)
12	27	810,000	202,500
18	66.5	1,995,000	498,750
30	90.9	2,727,000	681,750

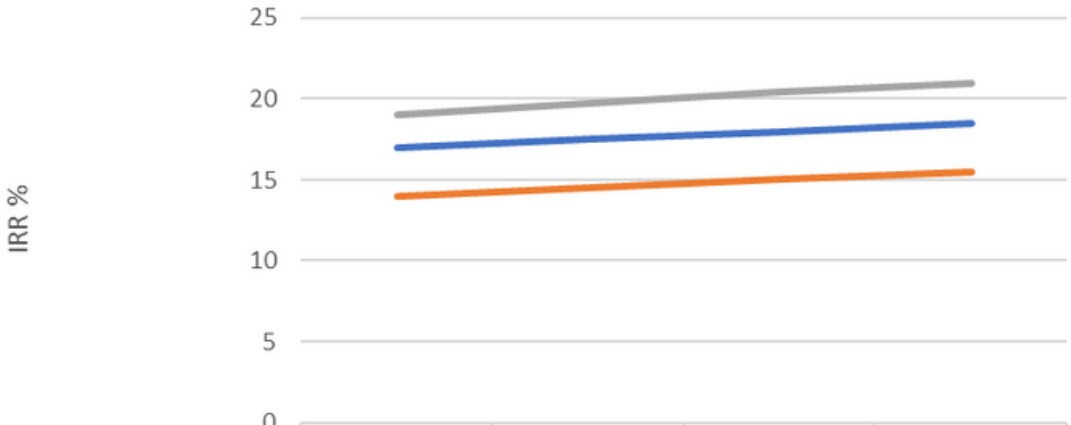
The yield of sawn wood from a plantation far surpasses those linked to forest concessions. The total yield over a 30-year period in the case of the Symbiosis plantation was estimated at 184.4 m3/ha and close to 300 m3/ha on a 36-year plantation. Correspondingly, the revenues from timber sales at constant prices ($800/m3) would be $240,000/ha at 30 years. The upfront investment cost is estimated at $5,000/ha.

More importantly, a plantation business would trigger activities in forestry research, genetic selection of plantings, development of nursery protocols and the associated quality control mechanisms all requiring of a qualified labor force. All of these are elements that would contribute to the improvement of the forestry sector in Peru. It is estimated that a plantation, based on native species would require of between 1-2 permanent positions per thousand ha.

Plantations (*continued*)

Figure 16 presents the analysis of IRR for a 30,000-ha plantation. The results indicate that plantations can yield attractive financial results. The returns, however, are long-term as the germination and maturation periods of native species can be slow. The successful development of native species plantation will thus require advanced planning including efforts to support R&D. Plantations on already degraded land will contribute to bringing those parcels into economic production, generating a GDP per ha that surpasses those of forestry concessions.

Figure 16. Estimated IRR for a 30,000-ha plantation of fine hardwoods



$/m3 of sawn wood	700	800	900	1000
Investment $5K/ha	17	17.5	18	18.5
Investment $6K/ha	14	14.5	15	15.5
Investment $4K/ha	19	19.7	20.4	21

At these levels of production (300 m3/ha over 30 years or 10 m3/ha year), you could theoretically meet all the demand for timber with plantations on 525,000 ha while helping achieve the reforestation goals of ProREST.

Conclusions

Photo: Division de catastro, zonificación y ordenamiento SERFOR

Conclusions

The policy and regulatory framework for forestry concessions on Permanent Production Forests is comprehensive and includes substantial guardrails for compliance. The Forestry Law is designed to "promote the conservation, protection and sustainable use of forests and wildlife" in the nation. It has established a robust set of regulations for forest operations including, inter alia, a requirement for forest management plans. In terms of logging, the law allows for concessions, which are formal contracts valid for up to forty years between the government and the concessionaire on specific tracts of public land for sustainable production of timber and other forest products.

Given the size of the forest resources in the country, the contribution of the wood sector to Peru's economy is relatively small. It employs a small fraction of the labor force (0.7%) but also has a small share of the GDP (0.7%). Furthermore, this share has been falling over time. The contribution of the forestry sector to export revenue is small (0.1% of total) and it is being affected by importers being wary of illegal activity.

***Governance and transparency issues are still a concern*.** While significant progress has been made recently to improve abidance with regulations, clamping down on illegal activity, there remain issues of governance and transparency which are reflected in the relatively high fraction of timber exports that are not yet compliant with regulations.

Forestry concessions are one of the key instruments used to ensure sustainability of the forest resource in Peru. Most forest concessions adjudicated to date are on areas of less than 40,000-ha. Previous assessments (Kemmeter, R. 2019) have concluded that forestry concessions of that size or smaller are either marginally financially attractive or are not financially viable.

Conclusions *(continued)*

This study focuses the financial analysis on forestry concessions between 50,000-ha and 100,000-ha:

It concludes that at current export timber prices of about $700/m3 to $800/m3 a 100,000-ha forestry concession is financially attractive; a 50,000-ha concession can be financially attractive if timber prices are $800/m3 or higher. Concessions able to produce a yield of 30% of sawn wood are financially attractive even at prices slightly under $700/m3.

However, it seems unlikely that profitability can be reached for concessions, even of this size, attending just to the domestic market for timber, at current prices and logging conditions.

The disconnect between the average size of concessions and the larger size required to gain economies of scale to be financially attractive may partially explain why so many small concessions have been abandoned. It may also explain why illegal activity skipping regulations on rotations, minimum diameters and logging of species under CITES appendixes continues to be prevalent.

Prices in the international market for tropical hardwood timber exports have been increasing over time, perhaps reflecting the increasing difficulty of access to stocks of fine hardwoods in primary forests and the continuing increase in demand in the global market. Efforts at protecting primary forests and limiting access to logging may also result in higher prices. As a result, there is the expectation that forestry concessions may result in improved financial returns in the immediate future.

Forestry concessions focused on legal extraction of species listed under Appendix 3 of CITES, already enjoy attractive financial returns.

Conclusions *(continued)*

The study compares the results of forestry concessions and carbon concessions of similar size on Permanent Production Forests:

While limited, and under the initiative of a few groups, efforts are being made to establish *de facto* carbon concessions in the country. Efforts and results in other countries can also be illustrative of the potential costs and benefits in Peru. These efforts are expanding even though the current carbon market for land-based investments has been hampered by low prices, a direct result of lingering uncertainties on the additionality and permanence of carbon removals and/or reductions.

Still, the analysis concludes that a 100,000-ha carbon concession under current conditions can yield somewhat to slightly better returns than an equivalently sized forestry concession at current conditions if and only if, able to access premium prices in the carbon market. To secure a higher price, concessions in permanent production forests need to demonstrate robust additionality, secure permanence and prevent leakage. A 50,000-ha carbon concession also compares favorably with a similarly sized forestry concession in terms of financial viability, when meeting those same conditions

There is an expectation that the VCM will react to better and more transparent accreditation and monitoring efforts. Further, there exists a potential upswing in financial viability for carbon concessions, once conditions stabilize and, the Voluntary Markets and the European Trading System seek parity.

On the other hand, carbon concessions require a lower level of investment, smaller labor force and therefore, if these concessions replace current forestry concessions, the aggregated GDP and labor contributions to the economy are likely to be smaller.

Carbon concessions have other advantages: Avoiding the logging of primary forests conserves the natural capital of the country with other co-benefits for local communities, climate and hydric regulation and biodiversity conservation, which are not normally accounted for.

Conclusions *(continued)*

But these efforts are obstructed by difficulties. If a decision is made to promote carbon concessions, the incentives and regulatory frameworks need some adjustments.

- For example, the ability of forest concessions to avoid logging altogether and instead focus on its productive management as carbon sinks and stocks could be enabled once a forestry concession is approved.

- The level of penalties for engaging in illegal timber extraction should be increased. Illegality is very onerous for local communities and the State.

- A clear and transparent bidding process for carbon concessions needs to be adopted requiring proven expertise in the management of forests and history of successful engagement with local communities.

Given the poor profitability of small forestry concessions, the lack of capital and qualified manpower, the aggregation of small concession areas into a larger area is required to improve their financial outlook. Further, small forestry concessions could also aggregate into a larger carbon concession, without the need for large capital outlays and providing a better financial outcome.

There is a potential and important synergy between the conservation efforts in Peru, which have also been affected by illegal activity and the efforts to make productive permanent forests more sustainable through: better access to markets; promotion of economies of scale; ratcheting up of enforcement and stiffer penalties on illegal activity. This implies a joint effort by the Ministry of Environment and MIDAGRI where conservation and production goals can be coordinated. The benefits, if adopted as a policy of the state, can be substantial for the country.

If carbon concessions are implemented on permanent production forests engaged in timber production, some share of legal logging activity could be displaced. To address the legal market and its contributions to the economy, efforts could be undertaken to restore degraded forests with plantations of native species selected to meet market demand for timber. This effort will take time but can make a significant contribution to the market and conservation efforts.

Conclusions *(continued)*

The analysis shows, based on a similar effort in Brazil, that a plantation of native species could yield attractive financial results over the long term. Plantations require of a higher level of investment in infrastructure, R&D, services, and it would require of a large labor force to maintain, harvest and transport the products.

The use of plantations using native species could potentially displace most of the requirements for timber from forestry concessions. Plantations would be able to meet the demand for timber in Peru with the utilization of 525,000-ha of degraded land, meeting partially the reforestation goals of ProREST.

Table 6. Comparison of Forestry and Carbon Concessions on Permanent Production Forests and Plantation on Degraded Land

	Forestry concession	Carbon Concession	Plantation
Area (ha)	100,000	100,000	30,000
Initial capital outlay (*) $ per ha	11	2-3	5,000
Average revenue generated (**) $/year	1.0 million	0.4 million	46.1 million
Labor force per 1000 ha	3	0.5	1-2
Financial return (IRR) at current market conditions	11% at $700/m3 sawn wood 20% at $750/m3 sawn wood	22% at $7/ton CO2 equivalent	18.5% at $1000/m3 of precious hardwood sawn wood.
Upswing in market conditions	27% at $800/m3 sawn wood	65% at $10/ton CO2 equivalent	19 % at $1100/m3 of precious sawn wood.

(*) Based on data reported or calculated by Kometter, R., 2019; VCS PDD for Loreto 1., 2021; and Symbiosis Business Plan, 2024.

(**) Based on a selling price of $800/m3 of sawn wood for Forestry Concession, a price of $7/ton CO2 e for Carbon Credits and a price of $1000/m3 of sawn wood for plantation of fine hardwoods.

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