The Production-Protection Compact in the Peruvian Context

L.T. Szott, L.M. Ormeño, G. Suárez de Freitas, V. Galarreta, R. Edwards, I. Alcántara, D. Coronel, O. Saavedra, M. Leal, E. Mendoza

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Acronyms

ENBCC:	Estrategia Nacional sobre Bosques y Cambio Climático / National Strategy on Forests and Climate Change
PPC:	Production-Protection Compact
WWF:	World Wide Fund for Nature
ICDP:	Integrated Conservation and Development Projects
INDC:	Intended Nationally Determined Contributions
LULUCF:	Land Use, Land Use Change, and Forestry
MINAM:	Ministerio del Ambiente - Perú
AT:	Technical Assistance
REDD+:	Reducing Emissions from Deforestation and Forest Degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.
FCPF:	Forest Carbon Partnership Facility
GCF:	Green Climate Fund
UNFCCC:	United Nations Framework Convention on Climate Change

Preface

Peru recognizes the strong and direct influence of small-scale agriculture as one of the major direct causes of deforestation in the Peruvian Amazon. For this reason, since 2008 Peru has been making efforts at a national and sub-national level to achieve zero deforestation, in which it has committed itself as a target for 2021. Among these efforts is the adoption of the National Strategy on Forests and Climate Change - ENBCC (July 2016), which guides the way of multiple current initiatives that address deforestation, agriculture and poverty.

The Alliance of Forest Trends, Earth Innovation Institute and Mecanismos de Desarrollo Alternos is working with the Peruvian Government, funded by the Government of Norway and coordinated by WWF Peru, to start a path oriented to implement the ENBCC, that allows the country to achieve reduction of emissions in the Peruvian Amazon. This publication is the second in a series of publications that analyze the application of the Production-Protection Compact (PPC) in Peru. In the first publication entitled "Toward a Production-Protection Compact for Peru: Elements and Lessons from Global Experience" was emphasized how the vicious circle of poverty-low productivity-deforestation can and should give way to an effective environmental protection compatible with profitable agricultural production. In addition, there was performed the characterization of the key elements, best practices, lessons learned and risks of a successful PPC, based on the critical review of the international experience, which serve as a basis for the Peruvian context.

This second publication performs a critical analysis of the interpretation and application of the PPC with special emphasis on the Peruvian reality specificities. For this purpose, a review and synthesis of the priority information on deforestation in the Peruvian Amazon, centered on the value chains associated with deforestation: coffee, cocoa and palm, is executed. Also, here it is the identification of the key elements and lessons learned from the PPC experience in Brazil, although always pointing out the main differences. Finally, a path with greater probabilities of success for a sustainable agricultural transformation with looking forward to a tailor-made Peruvian PPC is identified.

We reiterate our gratitude to the governments of Peru and Norway for the commitment, confidence and constant feedback on this work, which have strengthened the discussion and evolution of the results obtained at each step of the experts and actors involved. We believe that these efforts contribute to improving the strategies, guidelines and lessons learned to guide the transition to low emissions agriculture in Peru. We express our desire to continue to contribute jointly and in solidarity to improve the policies of the peruvian forest landscape.

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Executive Summary

Deforestation in the Peruvian Amazon is estimated to contribute to more than half of the country´s actual as well as projected, greenhouse gas emissions and the reduction of deforestation is the centerpiece of Peru´s strategy to reduce national emissions by 30% by 2030.

The PPC can form a key element of Peru´s strategy to reduce deforestation, since it asserts that environmentally sustainable and economically profitable agricultural production can be combined with increased forest conservation to enable truly sustainable development that improves livelihoods and environmental protection. A principal challenge of the PPC, however, is to show how forest conservation can be synergistically combined with increased production by small farmers with weak linkages to small markets that value sustainability and reduced deforestation, especially considering that conservation may result in reductions of income of farmers who are land limited.

In this paper we take a critical look at the interpretation and application of the PPC concept in the Peruvian context and the adaptations needed in order to increase the chances for its success. We begin by examining the characteristics of deforestation in the Peruvian Amazon and the coffee, cocoa, and oil palm value chains implicated in deforestation. This is followed by a short description of the application of the PPC strategy in Brazil in order to identify key elements and their potential application in the Peruvian Amazon, as well as the identification of major questions and areas of uncertainty. Finally, we attempt to outline the way forward for implementing the PPC in the Peruvian Amazon.

The PPC experience from Brazil, applied to its great deforestation, suggests that key elements for Brazil´s success included: public pressure exerted by multiple stakeholders on governments and businesses to change land use business practices and government policies related to agricultural production and forest conservation; the small number of powerful businesses involved; the relatively few, but large farm holdings; a ►

command-and-control governance structure based on land use monitoring and enforcement capacities; disincentives such as the threat of prosecution and loss of access to credit; and commercial embargos by buyers and processors of commodities produced as a result of deforestation.

Similar to other contexts, including certain Brazilian states, agriculture and land use in the Peruvian Amazon is dominated by small, dispersed, unorganized, and informal farmers with little capital and weak market linkages, who exist in a context of weak forest and land use governance and complex value chains. This context creates a number of challenges for the PPC due to: the difficulties of using market pull and stakeholder pressure as driving forces for behavioral change; the lack of governance and financing for establishing enabling conditions for sustainable land use, improved and more sustainable productive systems, and incentives forest conservation or reforestation; and the high costs and administrative and legal barriers associated with farmer formalization. The Peruvian case is further complicated by loopholes in the legal framework, the chronic lack of coordination or alignment between forest and land use legal frameworks, and inadequate budgets for land use monitoring and enforcement, especially at the level of the regional governments responsible for enforcing forestry laws. Furthermore, the lack of multi-stakeholder groups interested in reducing deforestation means that there is little opportunity to exert strong and persistent political pressure at the national or regional levels aimed at reducing deforestation.

This panorama suggests that a different PPC approach may be necessary in Peru. A greater emphasis is needed on: developing accessible credit; promoting farmer organization in order to provide leverage and economies of scale, reduce transaction costs and risks, and increase formality; increasing market linkages; and providing incentives to increase agricultural productivity and competitiveness and forest conservation, rather than disincentives for deforestation.

Given the early stage of development of the PPC, its complex nature, the high degree of informality of agricultural production, and the multiple financial, institutional, and human resource limitations present in Peru, a step-wise approach is needed. In the short- and medium terms, increasing market pull and linkages for sustainable products and access to agricultural credit conditioned on forest conservation are the measures most likely to drive the desired changes at the farm level. More accessible credit conditioned to reduced deforestation can have manifold impacts: promoting farmer aggregation, improving production, increasing the marketability of agricultural products, and promoting conservation. Credit should be accompanied by farmer aggregation and the use of technical assistance (TA) and other services, technologies, and inputs due to their importance for increased productivity, incomes, and the formalization of farmers.

These measures should be supported by the consolidation and expansion of incipient stakeholder platforms presently dedicated to the development of regional branding based on reduced deforestation and involving buyers, producers, credit suppliers, and government representatives.

In order to ensure that productivity improvements do not drive further deforestation, more needs to be done to improve land use governance (e.g. land use classification and zoning, assignment of rights, monitoring and enforcement) in order to provide a solid basis for private sector investments, increase incentives for conservation, and discourage deforestation as a strategy of productivity maintenance or capital accumulation. Since these measures are largely dependent on regional or local governments with limited capacities, it is likely that they will only occur in the medium- or long-terms as governments follow the lead of early stakeholders. As an interim measure, land use governance, especially land use monitoring and enforcement, should incorporate multiple actors including those of the private sector.

Financing these changes is critical and is addressed in a subsequent paper. Although, farmer aggregation, credit, and TA have the potential to be self-sustaining, external funding may be needed to "prime the pump". In addition, substantial public investments may be needed to provide the conditions that enable and support private investments and access to capital, as well as incentives for those investments. It seems unlikely in the case of Peru that the global sustainable supply chain agenda can help finance and transform production systems in short and medium terms, since the principal crops associated with deforestation, coffee and cocoa, do not form part of that agenda.

1. Introduction

The PPC asserts that environmentally sustainable and economically profitable agricultural production can be combined with increased forest conservation to enable truly sustainable development that improves livelihoods and environmental protection. The roots of this concept can be traced back to the mid-1980s, when the World Wide Fund for Nature (WWF) attempted to improve the quality of life of rural people through projects integrating the management of natural resources, particularly biodiversity, with economic development, and gave birth to a whole generation of integrated conservation and development projects (ICDPs). However, subsequent evaluations suggested that ICDPs have not achieved the success originally predicted, based in part on unrealistic and overly simplistic assumptions and approaches, oftentimes irreconcilable conflicts between conservation and development, problems associated with the participation and distribution of benefits to local stakeholders, and the governance and financial sustainability of ICDP initiatives (Brandon and Wells, 2009, CIFOR, 2007; MacKinnon, 2001).

More recent experience with the PPC from Brazil and elsewhere suggests that the application of a more comprehensive and integrated framework increases the chances of success and sustainability (Nepstad et al., 2009; Boucher et al., 2013). As we presented in a previous paper (King et al., 2016), key interrelated elements of the PPC include: 1) engagement and coordination of the private sector, government agencies, and producers through a strategically-coordinated multi-stakeholder platform; 2) improved land use planning, monitoring, and governance; 3) the formalization of land-use rights and use of forests; and 4) strategies and incentives for improving agricultural productivity and investments in degraded areas or those under production in order to increase production eco-efficiency. This final element contains three sub-elements or processes related to: i) the aggregation of producers to increase economies of scale and reduce risk, ii) improve services for climate smart agriculture (TA/technologies, input purchases, market linkages), and iii) increase access to credit or incentives, aimed at increasing productivity and profitability.

Figure 1. Elements of the Production-Protection Compact

Source: King et al. (2016)

Measures to increase forest conservation are integrated across all these elements and range from forest land classification and the assignment of forest usufruct rights to conditioning credit based on on-farm forest conservation and the incorporation of forest conservation as attributes of regional brands as well as product certification systems and standards. Similarly, these elements are also horizontally connected by a monitoring system enabling the monitoring and adaptive management of land use. Figure 1 depicts these elements, the participation of both the public and private sectors, and how they play out on a continuum of farm, agro-forest and forest land uses across the landscape. This description is consistent with the essential elements of the territorial performance system used by the Earth Innovation Institute in Brazil (Earth Innovation Institute, 2015).

Peru is in the process of gathering further information and testing and adapting the PPC concept in its Amazonian region where small famers practicing subsistence shifting agriculture predominate and institutions and governance are weak. In this paper the Peruvian PPC consortium of MDA, Forest Trends, and the Earth Innovation Institute takes a critical look at the interpretation and application of the PPC concept in the Peruvian context and the adaptations needed in order to increase the chances for its success. We begin by examining the characteristics of deforestation in the Peruvian Amazon and the coffee, cocoa, and oil palm value chains there. This is followed by a short description of the Brazilian PPC strategy and its potential application of its elements to the Peruvian Amazon, as well as the identification of major questions and areas of uncertainty. Finally, we attempt to outline the way forward for implementing the PPC in the Peruvian Amazon.

2. Deforestation and Agriculture in the Peruvian Amazon

Summary of deforestation in the Peruvian Amazon

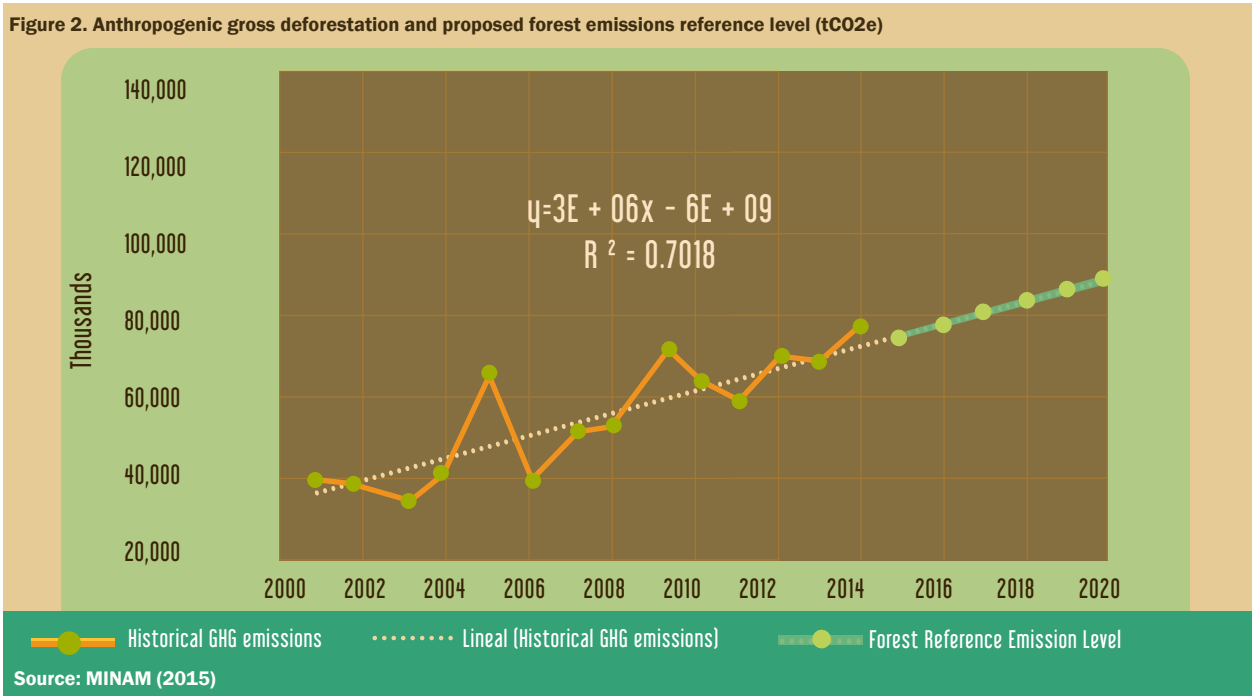
Peru is the second country with the largest area of rainforest in Latin America. However, accelerating deforestation and forest degradation are threatening its diverse ecosystem services. For the Amazon ecoregion, which includes about 95% of the country's forests, an average of 113,000 ha/y has been deforested between 2000 - 2014, but there is a clear upward trend in deforestation, which has more than doubled from 84,000 ha/y to 177,000 ha/y during the same period (MINAM, 2016). In Peru´s intended nationally determined contributions (iNDCs) reported to the UNFCCC in 2015, deforestation is estimated to contribute to 51% of the country´s total GHG emissions (INFOCARBONO, 2014)[1]. Projections under the business-as-usual scenario suggest that 3.5 million deforested hectares will be added by 2030 to the 7.3 million already existing hectares that are actually deforested (Figure 2), resulting in an increase of more than 50% in both national as well as Land Use, Land Use Change, and Forestry (LULUCF) sector emissions. At the same time, mitigation of 53.6 MtCO2e/y of emissions from the LULUCF sector are expected to contribute to two-thirds of Peru´s expected emission reduction goal of 30% in 2030 (MINAM, 2015)[2].

On a landscape scale, the Amazonian highlands (1000 – 2300 m above sea level - masl) and high jungle (400 – 1000 masl) have the least forest cover due to historical processes of migration and deforestation, whereas the low jungle (less than 400 masl) has the greatest amount of forest, but also the highest current rates of deforestation as well as the greatest amount of deforested land (Table 1).

[1] INFOCARBONO. National Inventory of Greenhouse Gases, 2012. MINAM, Lima, Peru. http://infocarbono.minam.gob.pe/inventarios-nacionales-gei/inventario-nacional-de-gases-efectos-invernaderos-2010-2/

[2] MINAM (2015). http://www.minam.gob.pe/wp-content/uploads/2015/06/contribucion-NDC21.pdf

Figure 2. Anthropogenic gross deforestation and proposed forest emissions reference level (tCO2e)



Source: MINAM (2015)

Analyses[3] [4] suggest that deforestation occurs on a small scale (about 88% of deforestation occurs on a scale of less than 5 ha) and is associated with agriculture practiced by small and medium-sized landholders (Figure 3). Much (47%) of the deforestation occurs on "no-mans-land", i.e. unclassified lands with unassigned rights. At a more local scale, deforestation intensity is associated with 1) distance to roads or rivers that enable access to markets; 2) distance from population centers, 3) topography; 4)legal classification of forests (e.g. protection, productive concessions, etc.)[5]. However, the evolution of deforestation on the agricultural frontier is varied and depends on the types and origin of farmers involved, migratory and colonization processes, the history of land use, the principal crops and dominant productive strategies, the size of landholdings, and the opportunity to access incentives provided by development programs (Robiglio et al., 2015).

According to Peru´s National Forests and Climate Change Strategy (MINAM, 2016), the principal direct causes of deforestation include agricultural/livestock expansion, ➡

Table 1. Forest cover and forest loss in the three landscapes

Landscape	Forest cover, 2011 (ha)	% of total forest cover	Forest loss (2000-2011) (ha)	% of total forest loss
Highland	7,676,400	11	295,394	26
High jungle	7,334,090	11	195,672	18
Low jungle	53,101,311	78	646,896	56
Total	68,111,801	100%	1,137,962	100%

Source: Robiglio et al., (2015).

[3] Estrategia Nacional sobre Bosques y Cambio Climático (2016). MINAM, Lima, Peru.

[4] Robiglio, V., M. Reyes Acevedo, and E. Castro Simauchi (2015). Diagnóstico de los productores familiares en la Amazonía Peruana. ICRAF Oficina Regional para América Latina, Lima, Perú.

[5] Zegarra, E. and J.P. Gayoso (2015). Cambios en la agricultura y deforestación en la selva peruana: análisis basado en el IV Censo Agropecuario, p. 225-286, in Escobal, J., R. Fort, and E. Zegarra (eds.) Agricultura peruana: nuevas miradas desde el Censo Agropecuario. GRADE, Lima, Peru.

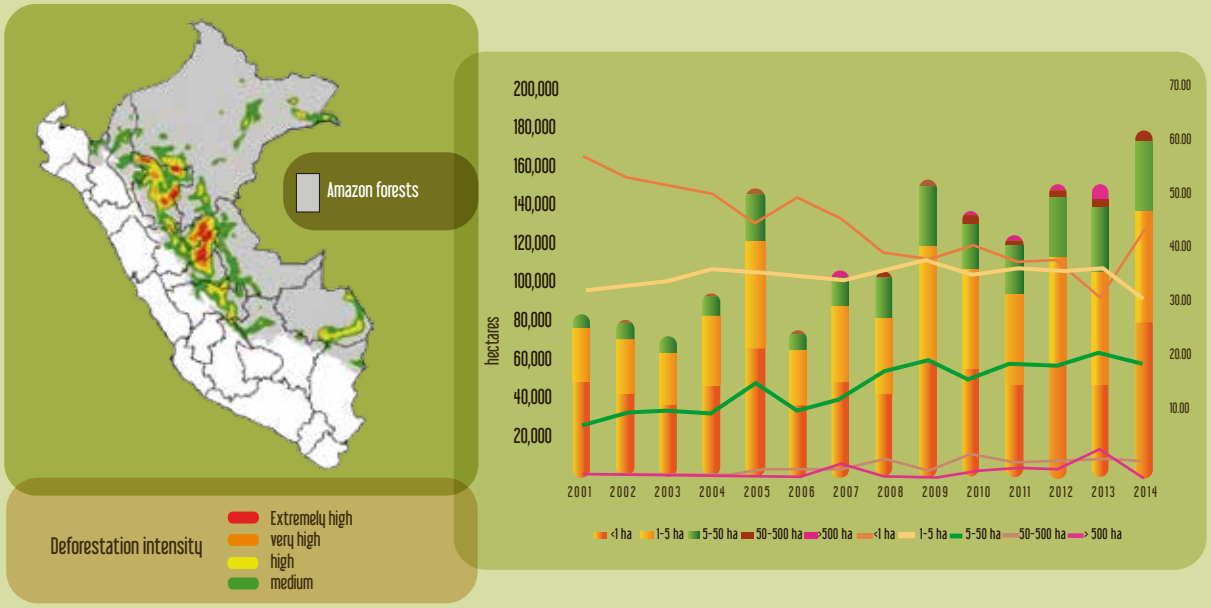
while illegal activities such as mining, and the expansion of extractive industries and infrastructure projects are of lesser importance. Illegal timber extraction is the main cause of forest degradation. Twelve deforestation "hotspots" or fronts have been identified and are located close to urban areas, highways, or in the transition zone from the Andean highlands to the lowlands.

Indirect causes of deforestation are many, which make their prioritization difficult, since they represent structural factors that usually act in concert but are difficult to pinpoint locally. In this regards, informality of small and medium-sized landholders (lack of land titles, access to credit, weak links with markets, lack of access to social benefits) interact with political/institutional (principally, inconsistent land use classification and zoning procedures and policies for assigning land use rights; weak forest monitoring, enforcement, and governance; and problems of institutional coordination), economic (sub-valuation of forests, opportunity costs of competing land use, capital limitations of farmers), and technological factors (limited TA, technology use, and credit) on the forest margins to cause deforestation and forest degradation.

The result of deforestation is the presence of millions of hectares of abandoned deforested land that could be reconverted into high value crops. Industrial or export crops account for 38% of the 1.8 million ha of the farm area under crops or fallow[6]. According to the 2012 Agricultural Census, these include coffee (25.4%), cocoa (8.7% but accelerating greatly), and oil palm (1.8%, but also accelerating). Pastures used for extensive grazing account for another 25% of the cropped area, followed by other crops (25%).

Robiglio et al. (2015) suggest that permanent crops grown by specialized small farmers, in association with livestock in the case of medium-size farmers[7], or planted on an industrial scale are the chief drivers of deforestation, not subsistence-oriented production. This is due to the investment capacity of these farmers that allows them to put larger areas into production.

Figure 3. Deforestation in relation to geography (left) and size of clearings (right).



Source: Programa Nacional de Conservación de Bosques para la Mitigación del Cambio Climático - Ministerio del Ambiente (2014)

[6] This figure is greater than that cited in Table 1 due to the approximately 700,000 ha deforested since 2011.

[7] Farmer classification: small farmers have < 10 ha of land in the high jungle and <15 ha in the low jungle; medium-size farmers have 10 – 50 ha in the high jungle and 15-115 ha in the low jungle (Robiglio et al., 2015).

Table 2. Net increases of annual and permanent crops (ha) in the Peruvian Amazon, 2004-2010.

Crop Type	Highlands	High jungle	Low jungle
Annuals	34,273	14,370	3,749
Permanent	41,605	37,432	12,351

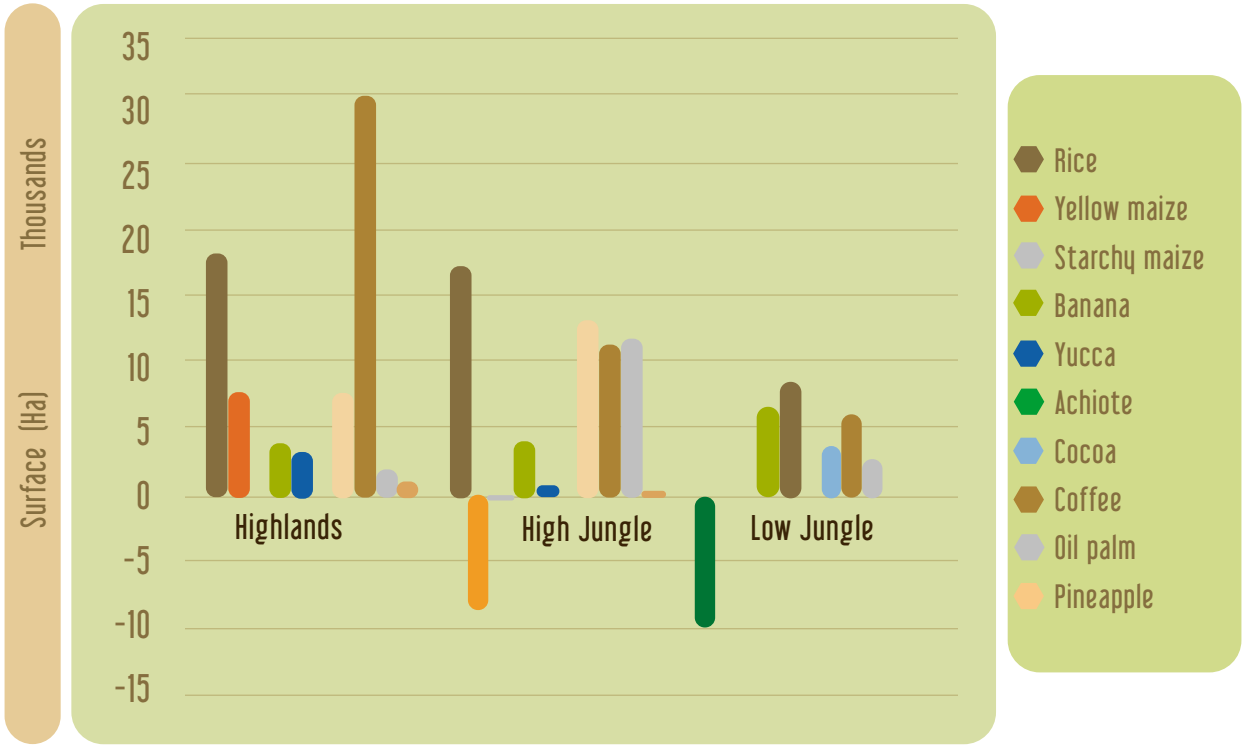
Source: Robiglio et al., (2015).

In general, greater deforestation is associated with medium-sized landholders, rather than small farmers, due to the greater resources and emphasis on livestock of the former.

Data from the Ministry of Agriculture and Irrigation on the net change in cropped area (ha) for the period 2004-2010 (Table 2) support this argument. The area of annual or transitory crops increased by 53,000 ha during this period, while permanent crops increased by 91,000 ha, a tendency that has accentuated in recent years. It should be noted that the data for the area of permanent crops is likely sub-estimated since it includes "harvested" area, and presumably excludes planted areas not yet in production.

Figure 4 shows that the expansion of permanent crops is led by coffee, followed by cocoa and oil palm. Coffee increased greatly in the highlands, while in the high and low jungle areas, increases in coffee, cocoa, and oil palm are observed. The increase of permanent crops in the low jungle is only about one-third that observed in the other two landscapes. It should be noted that increases in permanent crops has accelerated in recent years.

Figure 4. Net changes in the area of annual and permanent crops in 3 landscapes in the Peruvian Amazon, 2004-2010



Source: Robiglio et al. (2015)

Within small and medium-sized farmers' livelihood strategies, deforestation can be viewed as a mechanism to gain rights to land, maintain productivity, as well as to respond to market opportunities. The invasion of land, accompanied by deforestation and crop planting, is a mechanism used by farmers and land speculators to make "improvements" and exercise dominion over the land, as a first step to obtaining legal possession or land title. Prime examples are livestock farmers who cut forest and plant pasture, even though they are unable to stock the land with livestock. Once forests are cut and crops are established, rights of possession or titles can be requested from the government.

This process, which occurs in areas not classified for agriculture as well as unclassified lands, is enabled by the lack of knowledge of land users and government authorities of land classification procedures and inconsistencies of land classification and zoning that exist at various levels of land governance. The result is a system characterized by a lack of governance, corruption at various administrative levels, and informality, in which mechanisms of official control are weak and illegitimate land use changes appear as normal.

Once land rights are assigned, landholders can then become eligible for incentives provided by rural development or coca substitution programs, such as Agrorural, Agroideas, DEVIDA, or the Alianza Cacao Perú (ACP), which enable farmers to respond to market opportunities. These programs, which offer a variety of incentives related to TA, inputs, improved market access, or even land titling, usually require land titles or rights of possession as a prerequisite for farmer participation. In the case of coca substitution, farmers incorporate these programs into their livelihood strategies whereby coca is used to obtain capital and its subsequent eradication facilitates access to technologies, TA, farmer association, and market linkages, as a step towards the increase and consolidation of landholdings and productive systems.

The majority of the farmers in the Peruvian Amazon, however, do not participate in these development programs, use few inputs or credit and generally do not participated in producer associations (Tables 3 and 4). The majority of the soils farmed are nutrient-poor and are unsuited for permanent agricultural in the absence of input use. Once farmed they rapidly become nutrient depleted and are abandoned, thus forcing farmers to clear more forest. Since farmers can move on other public lands at little or no cost, they opt to substitute forests for input use and technology.

Table 3. Use (%) of technologies and inputs by small and medium-sized farmers in the Peruvian Amazon

Variable	Amazon Average	Highlands	High Jungle	Low Jungle
Irrigation	9	12	3	8
Certified seed	11	8	16	10
Fertilizers	21	23	28	9
Insecticides	18	15	28	11
Fungicides	30	27	45	18
Herbicides	15	13	25	7

Source: Robiglio et al., (2015).

Table 4. Membership in producer organizations and use of credit by small and medium-sized farmers in the Peruvian Amazon

Farmer type	Membership in producer organizations			Credit use (% of farmers)		
	Highlands	High jungle	Low jungle	Highlands	High jungle	Low jungle
Small	12	14	8	11	16	7
Medium	22	18	15	22	20	13

Source: Robiglio et al., (2015).

As such, farmers do not view forests as a source of natural goods, environmental services, nor income, but rather as future reserves of agricultural land. Thus deforestation is the best available alternative for farmers for maintaining agricultural (albeit low) productivity under conditions of inadequate technological and investment capacity as well as high aversion to risk. Combined with the relatively high costs of formalization, the result is the perpetuation of informality.

Unfortunately, this informal, forest-intensive system, which may be optimal for resource-poor farmers, is an inefficient use of public goods with high social costs, since the loss of natural ecosystems and their services produces little corresponding benefits for farmers or society in general, and contributes greatly to deforestation and Peru´s annual GHG emissions.

Progress towards reducing deforestation

In recent years, Peru has taken important steps in order to reduce deforestation and emissions from the LULUCF sector. Important legal and institutional landmarks related to REDD+ and the forestry sector are listed below, but many of the items in the list, such as the Forestry and Wildlife Law, and the National Forests and Climate Change Strategy, are in the initial stages of implementation and their effectiveness is unknown.

- The decentralization of forest governance towards the regional governments and the incipient incorporation of a territorial management approach.
- The new Forestry and Wildlife Law and its regulations.
- The National Forest and Wildlife Policy.
- The National Forest and Wildlife Plan, presently under development.
- The recently approved law and regulations for the distribution of benefits provided by ecosystem services.
- The re-initiation of land titling, especially of indigenous communities.
- The creation of the National Forest Conservation and Climate Change Mitigation Program as part of the Ministry of the Environment.
- The formulation and initial stage of implementation at the subnational level of the National Forests and Climate Change Strategy.

Peru has also made the reduction of deforestation and greenhouse gas emissions from the LULUCF sector the central focus of its NDC mitigation strategy reported to the UNFCCC (MINAM, 2015).

These efforts have been aided by bi- or multi-lateral projects aimed at preparation for REDD+, strengthening the capacities of indigenous groups, payments for results, or interventions in critical deforestation hotspots. REDD+-related progress includes: the strengthening of its forest cover monitoring capacity, via the Forest Cover Monitoring Module which conducts the annual monitoring of ➡

forest loss; the establishment of an early warning system that provides weekly reports on deforestation; the formulation and recent approval by the UNFCCC of the country´s Reference Level for the Amazonian biome, based on data from 2001-2015; the monitoring of changes in land use; and the initial steps to monitor forest degradation.

Major gaps for reducing deforestation

Despite this progress, there is little evidence as yet to suggest that deforestation is being reduced. A number of legal, institutional, technological, and financial gaps and barriers, alone or in combination, hamper the reduction of deforestation in the Peruvian Amazon and the creation of formalization. On the one hand, policies and budgets of the sectors linked to the zoning and management of the forest landscape at the national and regional levels are not fully consistent nor aligned and the capacity to apply and enforce forestry regulations at both levels is limited. This affects the establishment of enabling conditions related to land use, i.e. assigning rights to uncategorized forests; land use zoning, planning, and titling; monitoring, control, and enforcement of land use, by both the national and regional governments, which is further hampered by the magnitude of the investments needed, on the order of more than $1000 million during the next 14 years (Limachi Huallpa, 2015).

Within this context, contradictory laws, policies, and legal loopholes that should be amended or eliminated include the following.

- Promotion of the colonization of the Amazon, via tax incentives.
- Policies that promote biofuels that result in increased deforestation.
- The law for the formalization of small and artisan mining, which increases the size of the areas dedicated to mining as well as the accumulation of areas by intermediaries, while stipulating only minimal environmental responsibilities.
- Legal norms and procedures for promoting agricultural land use.
- Legal framework that limits the granting of private titles to forest lands that form part of the national patrimony.
- The lack of alignment between land uses recognized under the new Forestry Law and the procedures used to grant land titles (see http://www.dar.org.pe/wp-content/uploads/2016/06/procedimiento_agropecuario_bosques.pdf)
- The use of deforestation as a requisite in order to show possession and obtain title to land (MINAM, 2016).

Procedures under the new Forestry Law for granting concessionary rights for agroforestry and agricultural on forested lands also need to de designed, analyzed, and implemented. More attention needs to be paid to assuring the transfer of forest management authority to the regional governments and strengthening the limited technical, financial, and human resources capacities for territorial management and governance by regional authorities and institutions. These changes need to occur in tandem with improvements in land use information, planning, and policy coordination at the national level.

Of all the actors, producers and businesses have the greatest potential for investing in sustainable land use. That said, private sector investment is currently constrained by barriers such as the relative lack of financial instruments aligned with productive and investment cycles, high financial costs associated with high transaction costs and risk perception, as well as the lack of hard collateral such as land tenure and property titles to pledge as guarantee in order to access credit. Small and medium-sized farm-holders also have limited technical and financial capacities and connections to markets.

For that reason, a more comprehensive and integrated approach, such as the PPC, for working with multiple stakeholders needs to be intensified in order to produce a transformational change in agriculture in the Peruvian Amazon. This, in turn, implies a reduction in the administrative procedures, costs, and legal requirements in order to achieve formalization.

3. Brief Description of Coffee, Cocoa, and Oil Palm Value Chains in the Peruvian Amazon

As mentioned previously, in this early phase the PPC is concentrating on coffee, cocoa, and oil palm value chains due to the large area extent of these crops and their importance as deforestation drivers, their management by predominantly small farmers, and the geographic concentration of these crops in the Amazon, especially the regions of San Martin and Ucayali.

Value chains, and thus critical points for interventions, differ among these crops. The principal characteristics of the value chains for each of these crops are shown in the Table 5 below.

Oil palm approximates a traditional commodity where limited, but relatively tight functional and commercial linkages exist among a small number of processors and producers located in close proximity to the relatively few existing processing plants.

Table 5. Characteristics of coffee, cocoa, and palm oil value chains in the Peruvian Amazon.

Characteristic	Coffee	Cocoa	Oil palm
Total # producers (families)	223,000	90,000	7,209
Organized	29%	30%	81%
Independent	71%	70%	19%
Production share by sector			
Small holders	85% of farms < 3 ha	80% of farms < 2 ha	53%
Mid-size holders	-	-	5%
Corporate			42%
Geographic area of production	50% from San Martin, Cajamarca, and Amazonas	40% from San Martin	39% from San Martin, 39% Ucayali, remainder from Loreto and Huánuco
Total area under production (ha)	425,500	144,000	77,000 (47,000 under production)
Future increases expected	120,000-150,000 ha in 10 years	100,000-150,000 ha in 10 years	150,000 ha in 10 years
Total production 2015 (MT)	236,000	81,300	768,863 racemes of fresh fruit, 185,275 crude oil (2014)
Total production 2016 (MT, proj.)	286,000	n.d	n.d
Average Productivity (kg/ha)	450 – 675	600 - 800	10,000 – 14,000
Optimal (kg/ha)	1350 –2250	1000 – 1200	15,000-22,000
Technified (kg/ha)	2700 – 3600	2000 - 3500	23,000-28,000
Buyers	7 processors/exporters (5 private companies and 2 coops) hold 65% of the market.	8 processors/exporters (6 private companies and 2 coops) control 80% of market.	5 processors. Grupo Romero, controls almost all exports.
Main markets	USA, Germany	USA, Holland, Germany, Belgium and Italy	Domestic, crude oil
Producer Organizations	Producers: Junta Nacional del Café (JNC). Aggregates 70,000 families organized in 56 cooperatives or farmer associations. Cooperatives/farmer associations are mainly focused on commercialization and not all of them are members of JNC. Processors/exporters: Camara Peruana del Café y Cacao	Producers: Asociación Peruana de Productores de Cacao (APPCACAO) with more than 30,000 affiliated producers from 25 cocoa cooperatives and producer associations. Similar to JNC, not all cocoa producer organizations are affiliated with APPCACAO 26+ cooperatives only in San Martin.	Small and mid-sized producers: the Junta Nacional de Palma Aceitera del Peru – JUNPALMA aggregates 7,000 producers.

Technical assistance	Govt: Mainly provided by MINAGRI's National Coffee Renovation Plan to ~25% of farmers; also DEVIDA (about 27,000 ha, mostly in Huánuco) Private: Proyecto Desarrollo Sostenible del Café of JNC/CEIN-CAFE – limited to JNC members; Proasocio, with funding from the Neumann Foundation and some European roasters, serves about 1500 farmers. Programa Familia, related to Comercio y Compañia and Molinos & Cia. Both programs served about 1,000 farmers in total in San Martin and about 1,500 farmers in Cajamarca.	Mainly provided by government organizations like GORE San Martin, Ucayali and Huánuco; DEVIDA; multilateral agencies (UNDCP); and NGOs as part of coca eradication programs (e.g. Technoserve assisted about 25% of total farmers).	Producer-owned palm oil processing companies provide some TA. DEVIDA, multilateral agencies (UNDCP) and NGOs as part of coca eradication programs.
Threats	Climate change impacts on 183,000 ha lower than 1200 masl result in increased susceptibility to pests and diseases and quality, which increase credit risk and limit access to markets based on quality. Low prices, low productivity, and low input use result in economic losses. Lack of traceability and payment based on quantity, not quality, discourage quality improvements. Weak governance structure hampers coops´ and producer associations´ abilities to deliver additional services besides commercialization.	Low productivity and low input use. Use of hybrid varieties maylimit access to markets based on quality or flavor profiles. Weak governance structure hampers coop's and producer association's abilities to deliver additional services besides commercialization.	Low productivity and low input use. High processing and maintenance costs associated with under-utilized plant processing capacity
Opportunities	Conditions for specialty coffees exist on 170,000 ha. Opportunity to transition coffee below 1200 masl to other crops like cocoa	Presence of fine, aromatic specialty cocoa. Increases in international prices.	Domestic market for cooking oil. Palmiste oil for cosmetics.

Source: Prepared by the authors

In contrast, the farm-to-market chains for coffee and cocoa include a greater number of middlemen as well as unorganized farmers and are thus more diffuse, indirect, and less tight. Cocoa is intermediate between oil palm and coffee in the sense that about one-third of the farmers are directly associated with major buyers such as cooperatives, stockpilers/traders, processors/traders, or integrated agribusinesses, whose business models involve production, stockpiling (acopio), processing, and export to varying degrees. The principal actors and their characteristics are shown in Table 6. It should be noted that direct purchases of aromatic cocoa from international chocolate manufacturers are becoming more important. Competition among stockpilers has driven up cocoa prices to such an extent that profit margins for many processors/exports and for stockpile/exporters are minimal.

In a similar fashion, the formation of new cooperatives has decreased overall cooperative profitability due to reduced membership and economies of scale.

These value chains have certain characteristics in common that drive deforestation. Limited access to capital, lack of hard collateral or guarantees (e.g. land titles or secure land tenure), and investors´ perception of high risk limit farmers´ access to credit and consequently produce low levels of farm investment that result in low productivity and product quality. On the other hand, the scarcity of producer organizations and their current governance problems create serious challenges for supporting increased producers access markets and services needed in order to upgrade production, respond to environmental threats, or to take advantage of emerging economic opportunities.

Although farmer livelihoods and production can be improved by increasing input use, TA, and improving farmer organizations, closure of the Production-Protection cycle, whereby agricultural production and forest conservation advance simultaneously, is more difficult. Payments for conservation, conditioning credit to on-farm forest conservation, and linking improved production with differentiated markets that recognize crop quality as well as environmental or social safeguards are potential complementary and market-based solutions to this problem. These and other, non-market-based alternatives are discussed in Section 5.

Crop certification systems or branding that combine crop quality with environmental safeguards can potentially contribute to both, but this combination of criteria is largely absent from the more frequently used certification systems. Moreover, in the case of coffee, and to a lesser extent, cocoa, considerations of quality are often more important than sustainability or other attributes of formal certification systems, while in the case of oil palm, markets are less demanding of product quality. It should be noted that some certification systems have lost credibility and market share over the last years due to traceability and transparency concerns. In any case, the questions of how to combine product quality and environmental impact in certification systems and standards and the effect of the latter on the prices and sale of the three commodities in question are still not fully answered.

Table 6. Characteristics of actors in cocoa value chain in Peru

Business	Examples	Production	Stockpiling	Processing	Export	Services provided to producers
Vertically integrated cooperatives	Acopagro, Norandino, Naranjillo	+	+	+	+	TA, credit, social asst.
Producer cooperatives	Manu	+	+	–	+	Limited or no TA and credit
Stockpilers/ traders	Amazonas Trading, Sumaqao, Ecom	–	+	–	+	TA, social assistance
Stockpilers/ Processors	Macchu Picchu Traders	–	+	+	+	TA, credit, social asst.
Agribusiness	Romex Trading	+	+	+	+	TA, credit, social asst.

Source: Scott et al. (2016)

4. Applicability of the PPC elements to Peru

Reductions of Deforestation in the Brazilian Amazon

The Brazilian experience with increasing agricultural production and decreasing deforestation has strongly influenced PPC thinking in Peru, despite major contextual differences between the two cases. As a result, it is important to review the Brazilian experience[8] and the Peruvian context in order to identify differencesin initial conditions and how processes and instruments used in Brazil might be adopted, adapted, or replaced in the Peruvian context.

Historically, cattle ranching has been the largest driver of deforestation in the Brazilian Amazon, followed in recent decades by growing global demand for soybeans. Much of this expansion occurred in the 1990s and early 2000s, but between 2004 and 2014, this trend was reversed as deforestation in the Brazilian Amazon was reduced by 70%. This reduction was achieved by a series of measures applied incrementally over time at both the national and state (regional) levels, aimed at addressing the direct drivers of deforestation (principally soybean and cattle, as well as illegal logging and forest fires).

A number of factors and processes were involved (Table 7) since, under Brazil's federal system, states share responsibility for land use policies with the national government, but are also able to undertake more autonomous actions (see the example of Acre in Alencar et al 2012). While this results in a more complex and nuanced interpretation of just how deforestation was reduced in certain localities, there appears to be a broad consensus on the principal factors involved in the changes in organizational, business, and individual behavior achieved by Brazil.

[8] We concentrate on main measures attributed to the large-scale reduction of deforestation in the Brazil Amazon between 2004 and 2014. Some states, such as Acre and Mato Grosso, are more advanced in controlling deforestation or are beginning to target smallholders.

Table 7. Key elements of the reduction of deforestation in Brazil.

Element	Brazilian experience
Stakeholder Participation and Political Will	3 elements were involved: 1) the vision of reduced deforestation was changed from something imposed by foreigners to that of a theme of national interest; 2) political buy-in and pressure by state governments; 3) pressure exerted by broad-based coalitions on producers, local and foreign businesses, and the federal government, especially at critical points along the supply chains - not just the farmers and ranchers producing soy and cattle, but also the banks, slaughterhouses, exporters, and the intermediaries, supermarket chains, and local distributors of these products. This was enabled by the concentration of market power among a few actors, such as the vegetable oil trade association (ABIOVE) and major slaughterhouses.
Monitoring, Enforcement, and Prosecution	1. Monitoring enabled the detection of forestry law infractions over large areas and made it possible to crack down quickly in areas of new deforestation as well as targeting the patrol of roads that provide access to these areas. 2. Targets of enforcement were high-profile violators such as illegal sawmills, meat packing plants, and corrupt government officials. Although such enforcement campaigns are often episodic and occur in response to media coverage – which in turn is often generated by periodic data on deforestation or burning – they do have a cumulative effect of indicating that deforesting is no longer a risk-free activity. 3. The actions and threats of independent federal public prosecutors, particularly in the key states of Para and Mato Grosso, have provided incentives for voluntary compliance of moratoria by exporters, soybean processors, slaughterhouses, and supermarkets, thus making the supply chain part of enforcement system aimed at reducing deforestation by producers.
Industry Cooperation	Political pressure from interest groups and bad publicity resulted in a moratorium of commodities source from cleared rainforest by McDonalds, Cargill, and the Brazilian Association of Vegetable Oil Industries (ABIOVE) and the National Association of Cereal Exporters (ANEC), and the International Finance Corporation. The effectiveness of these measures was aided by the concentration of processing and exportation in the hands of a small number of large businesses.
Protected Areas and Land Use Rights	1. Brazil strategically created and enforced protected areas along the advancing arc of deforestation, thus maximizing the use of protected areas to curb deforestation. 2. At the same time, the recognition of indigenous land rights established the legal basis for these people to defend their territories from incursions and served to protect their way of life via the forests on which they depend. Beyond their role in reducing emissions and protecting the climate, the recognition and enforcement of land use rights of indigenous peoples also show the possibility of an alternative model of development of tropical forests without deforestation. 3. With regards to on-farm land use, the Federal requirements for legal forest reserves on private properties in farming and ranching regions was abruptly raised from 50 to 80% of each property in 1996, but without effective mechanisms for facilitating compliance.
International Incentives	The larger global community became involved in rainforest conservation. In 2008, Norway emerged as a leading force in forest conservation by pledging $1 billion to Brazil's Amazon Fund for rainforest preservation efforts in the Amazon, based on results-based financing backed up adequate monitoring and documentation of reductions in deforestation. Norway´s contributions were enable by a jurisdictional approach established by the National Climate Change Plan and the Amazon-level accounting of emissions reductions that it incorporated. Even though many of the actions implemented in the plan were performed by actors at lower levels – state governments, indigenous groups, trade associations, corporations and NGOs – the national plan created a framework to verify that all these actions, taken together, did indeed reduce Brazil's emissions.

Local Dis/Incentives and Support	Incentives and disincentives have been used to promote more sustainable land use and decrease deforestation. 1. At the Federal level, "sticks" such as the threat of prosecution (mentioned in the section on Enforcement above) and Federal campaigns to publicize and cancel credit for illegal land holdings, have been aimed at major players at critical points along the value chains. 2. "Carrots", except for the substantial flow of federal farm credit to farms in compliance, are more indirect and include non-reimbursable direct financing by the Amazon Fund, administered by the Brazilian Development Bank (BNDES), to projects that prevent, monitor and combat deforestation or promote the preservation and sustainable use of the Amazon Biome. Similarly, research institutes such as IPAM (Instituto de Pesquisa Ambiental da Amazônia) and IMAZON (Instituto do Homem e Meio Ambiente da Amazônia) have been important in showing how ranchers, farmers, and loggers can increase their productivity in ways that make deforestation unnecessary. 3. What has generally been missing are positive incentives for farmers and local governments to reach the performance targets[9], although there are some exceptions. At the state level, for example, Amazonas and Acre, have stitched together an innovative combination of policies – payments to villages that conserve forests, support for sustainable development projects, payments of benefits to families through debit cards, supporting education, health, transport and communications in rural areas.

Source: Prepared by the authors

Although a number of different interpretations of the Brazilian success exist, our interpretation is that public pressure by multiple stakeholders on governments and businesses set in motion changes in business practices and government policies that eventually impacted producers. The small number of powerful businesses involved, the relatively few, but large, farm holdings, as well as the command-and-control governance structure based on land use monitoring and enforcement capacities, augmented by disincentives such as the threat of prosecution and loss of access to credit, and reinforced by commercial embargos by buyers and processors of commodities produced as a result of deforestation, enabled these changes to occur on large geographic scales.

5. Applicability of the Brazilian Model to the Peruvian Context

Comparison of the Brazilian and Peruvian contexts shows that there are major differences between the two. (Table 8).

Clearly, the application of the Brazilian strategy in Peru is much more difficult due to weak land use governance and enforcement, the complex structure of value chains and distance of producers from end buyers or major intermediaries, and the relative lack of opportunities and political feasibility of applying disincentives to poor farmers (the threat of withdrawing credit has little force when the majority of farmers do not have access to it). The Peruvian case is further complicated by loopholes in the legal framework, the chronic lack of coordination or alignment between forest and land use legal frameworks, and inadequate budgets for law enforcement, especially at the level of the regional governments responsible for enforcing forestry laws, but with inadequate funding and human resources. Furthermore, the lack of multi-stakeholder groups interested in reducing deforestation means that there is little opportunity to exert strong and persistent political pressure at the national or regional levels aimed at reducing deforestation[10].

[9] Nepstad et al. (2015). Research and financial innovations in support of Brazil's INDC process. Earth Innovation Institute Policy Brief. July 2015

[10] It should be noted that measures to stop deforestation in Brazil are becoming less effective as the nature of deforestation has become more Peru-like. According to Godar et al. (2014), deforestation in Brazil is largely shifting to remote areas and is increasingly due to small farmers, which makes government enforcement more difficult. See also: http://www.vox.com/2015/3/2/8134115/deforestation-brazil-increasing..

Table 8. Comparison of the Brazilian and Peruvian contexts for the PPC.

Characteristic	Peru	Brazil
Purpose of deforestation	Overcome poor soil fertility and crop productivity decline; (approx. 20% of deforested land is under production while the rest is in fallow); land speculation.	Expand operations; land speculation.
Agents of deforestation	Large numbers of small landholders.	Limited number of large landholders (recently the focus has changed towards small landholders).
Value chain structure	Coffee and cocoa are complex, involving numerous intermediaries; markets based in part on quality or flavor profile; oil palm is relatively simple.	Relatively simple, dominated by a few large businesses, well-defined supply chain structures, and standard product quality.
Markets Mainly	Mainly international, via local processors and traders; limited direct access to international markets (mostly in palm oil).	Mainly international commodity markets, through producer organizations or large companies.
Market information and signals at the farmer level	Weak	Strong
Institutionality	Weak	Relatively strong
Land tenure	Mostly informal	Intermediate
Land use enforcement	Largely absent	Important
Famer associations	< 20% of farmers are associated; associations (cooperatives) are aimed at commercialization, not production.	Less important due to the structure of land-holdings. Industry and exporter associations are strong.
Technology and credit use	Few farmers use improved technologies; <20% of farmers access credit.	Technically advanced and highly capitalized producers use publically subsidized credit
Productivity	Low	Medium-high
Public pressure for reduced deforestation	Low	High

Source: Prepared by the authors

This panorama suggests that a different interpretation of the Brazilian strategy or approach is needed if the PPC is to be successful in Peru. Key elements include a greater emphasis on farmer organization in order to provide leverage and economies of scale and to reduce transaction costs and risks. Given the weak institutionality and enforcement capacity in the Peruvian Amazon, the strategy will also have to rely on incentives to increase agricultural productivity, competitiveness and forest conservation, rather than "sticks" for cutting down forests. Nevertheless, the correct balance of incentives for agricultural productivity vs. forest conservation in order to achieve both is unclear. Incentive-based programs aimed at the municipal or farm levels that promote reductions in deforestation while reducing rural poverty via payments for conservation may be needed (Nepstad, 2015).

It also suggests that greater reliance on the private sector will be needed to generate the will and financing necessary to implement the changes needed. Given the lack of social pressure on deforestation, greater involvement by the private sector, however, will depend in large measure on governmental efforts to provide the conditions that enable and support private investments and access to capital, as well as incentives for those investments.

5. PPC Components in the Peruvian Amazon – Experiences, Current Status, and Questions

The PPC concept is based on a number of assumptions that need closer examination. Below, we mention and discuss the experience, major assumptions, and questions regarding the application of PPC components in the Peruvian context.

Multi-stakeholder platform: Experience from Brazil shows the importance of a multi-stakeholder platform to promote the reduction of deforestation and to lobby governments and businesses to change policies and practices that further that goal. In Peru, numerous multi-stakeholder consultations related to REDD+ and forestry have been carried out relatively successfully in the Peruvian Amazon, but these have required substantial time (consultations and elaboration of the new Forestry Law and its Regulation required 3 years) and have been one-off in nature.

To date, the experience of the current project has focused on generating interest in the PPC concept and the formation of consensus regarding the development of regional branding among public and private sector actors at the regional level. Nevertheless, the question remains whether a prolonged and sustained consultation process resulting in the consensual construction of a new system of land use governance is feasible given the atomization and lack of higher level organization of the major actors, limited technical capacity of government and civil society representatives, asymmetry of power relations, limited public budgets, the low priority given to deforestation by multiple actors, and the lack of social capital characteristic of Peruvian society in general. These factors could contribute to limited stakeholder participation, a lack of consensus, drawn-out negotiations resulting in participant "burn-out", or superficial results. Other questions regard which actors are critical for this process (given the lack of organization and the multiple actors at different levels of the supply chains) and how can they be motivated to participate during a prolonged period of time.

Governance: Weak forest and land use governance exists at the national, regional, and local levels, which has implications for the establishment or improvement of enabling conditions for

land use (especially land titling, the assignment of rights, and enforcement), the suitability of options for promoting improved agricultural production and forest conservation, and investments in these systems.

There are a number of questions related to the role of the public sector in these processes. Many of the PPC measures could benefit from public sector support, but the regional governments especially do not have sufficient financing to carry out their mandate due to structural problems with the assignment of funds by the national government.

This barrier is particularly important for the establishment of enabling conditions for sustainable land use. Order-of-magnitude estimates suggest that incremental investments of approximately $1.1 billion are needed in order to establish enabling conditions of forest classification, assignment of rights, land titling, usufruct concessions, and systems of land use monitoring and enforcement on 20 million ha of land by 2030. These improvements are needed in order to create suitable conditions for private investment.

Funding shortages also affect the capacities of regional and local governments to promote commercial alliances, develop and promote regional brands, and exert political leadership. As a result, the roles and degree of involvement of regional governments in the PPC process is uncertain and further analyses are needed of how the regional governments might be enabled. In some areas (e.g. land use monitoring and enforcement), the participation of private sector actors (e.g. buyers, credit institutions) may be needed to overcome weaknesses of the public sector.

Farmer aggregation: Farmer aggregation is needed in order to provide economies of scale, reduce transaction costs, and increase bargaining power related to TA delivery, input purchases, access to credit, and product commercialization. Nevertheless, perhaps one of the most striking features of farmers in the Peruvian Amazon is the low level of association among producers. This is likely due to a number of factors: the low level of social capital in Peruvian society in general; the pioneer, self-sufficient mentality of landholders on the agricultural frontier; the fact that in some cases, land occupation is illegal or for speculative purposes; negative prior experiences with cooperatives; reliance on the traditional system of middlemen, stockpilers, or traders characterized by individual, farm-gate attention, and up-front payments to farmers; and a general lack of knowledge of the opportunities presented by aggregation and how to go about achieving it.

On the other hand, experiences of agricultural development and coca substitution projects in the Peruvian Amazon, such as Agroideas, Agrorural, COFIDE, Sierra Exportadora, Sierra/Selva Alta, DEVIDA, Alianza Cacao Peru, clearly show that when incentives such as TA, credit, or access to markets exist, farmers are more eager to organize in associations. The degree of aggregation in oil palm vs. coffee and cocoa is also instructive because it suggests that tight relationships or vertical integration between oil palm producers and processors (producers are also shareholders in oil processing and commercialization), facilitate aggregation, whereas the aggregation of coffee and cocoa farmers is much reduced, unless external incentives are constantly provided by outside actors such as projects. The possibility of accessing future benefits can also be a powerful motivating factor for aggregation, as shown by the effectiveness of local or regional competitions aimed at technology adoption or enterprise development. This suggests that farmers perceive that the process of association has certain costs that can be overcome by concrete incentives or the promise of future benefits. Further information is needed on the factors that influence farmer decisions related to aggregation. Ideally, the formation and geographical concentration of farmer groups to reduce costs and create economies of scale should be prioritized in areas that are apt for production as well as aligned with sourcing strategies from zero deforestation territories.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Delivery of Technical Assistance and Other Services: The majority of TA in the Peruvian Amazon is provided principally by projects or regional governments to groups of farmers, and thus ignores the large majority of unorganized and dispersed coffee and cocoa farmers. As a result, the PPC proposes to aggregate farmers under a two-tier TA/service delivery system consisting of small groups of 10 – 20 farmers at the local level (nodes) that in turn form part of a provincial and/or regional services network(s) and to reduce the costs and improve the quality of AT, which are deficient in the delivery systems organized by the cooperatives or regional governments.
Under the PPC system, nodes are led by a promoter who is the main link with improved technologies and information provided by specialists at the network level; the promoter also serves as a conduit of AT to the members of the node via individual or group visits and demonstration plots established on the promoters´ farms. Nodes facilitate and supervise the adoption of technologies, the primary processing (beneficio) of coffee or cocoa, the programming of harvests, product quality, stockpiling, and solidarity-based loan performance and guarantees.

Potential TA methodologies used to increase adoption and reduce transaction costs at the level of the node include TA on-demand using communication technologies, contractual systems, promoters, demonstration farms, farmer-to-farmer interchanges, and competitions focusing on production/quality. However, many of these measures are untried in the Peruvian Amazon and need to be evaluated.

Networks, on the other hand, could provide agricultural services, such as TA and technologies, low-cost remote sensing technologies to diagnose and monitor crops, product transportation, regional stockpiling, financing, inputs, certifications, analyses, market information, and bulk commercialization to nodes at lower costs than BAU.

The node/network system embodies a number of underlying assumptions. A principal one is that this system can meet farmers´ needs and provide sufficient benefits while maintaining or reducing transaction costs, presumably through economies of scale. At present most TA is provided by development projects, regional or local governments at an annual cost usually in the range of $40-$150/farmer, but at little or no cost to the farmers except for labor as a counterpart contribution. This suggests that a network composed of 20 nodes of 20 farmers each whereby each pays $100/-year for TA would generate about $40,000 in gross income and raises the questions of whether farmers are willing to pay this amount and whether these payments are sufficient to cover personnel costs, investments in training materials, as well as the operating and administrative costs of TA.

With regards to other services provided by networks, it is assumed that their delivery may be less costly than current practices due to economies of scale unavailable to individual farmers or small farmer groups. Limited data from San Martin suggest that stockpiling, warehousing, and commercialization costs of coffee can be reduced by approximately 50% by the use of a network compared to the costs of cooperatives (due to costs associated with the large administrative structure of cooperatives), or 16% compared to commercialization by individual farmers. Presumably, costs related to transport, warehousing, grading, certification, administration of credit and input purchases would also be reduced by economies of scale and could conceivably be paid from the credit received by farmers or the additional income generated by greater yields or quality of coffee or cocoa.

Networks, however, may also entail additional management and communication costs due to the additional complexity of network operations. These costs may partially or wholly offset other savings achieved through economies of scale. These additional costs need to be estimated in order to determine whether savings do indeed occur or whether the system represents a redistribution of costs among actors. Farmer willingness to assume, directly or indirectly, these costs also needs to be determined.


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An additional question related to the viability of networks is the availability of management expertise. Scott et al. (2015) attribute the less-than-encouraging experience and low profitability of cooperatives in Peru to problems related to providing services to and maintaining the loyalty of their members, as a result of poor management, especially financial management, of the cooperatives and the lack of economies of scale due to a small membership base. It is unclear how networks might overcome this obstacle. The experience with oil palm suggests that limiting the services provided by processors to farmers, mainly consisting of product transport to the processing plant and commercialization of oil, but not credit, inputs, or TA, may be an intermediate solution. This decision also needs to consider potential profit margins of the services provided and the particular interests of the actors that assume the network articulation role.

Network Articulation: As suggested above, a major question related to networks regards the availability of providers of these services. Given the atomized nature of farmers, articulators are likely needed to stimulate aggregation and link farmer groups or nodes to inputs, credit suppliers, and markets potentially provided by networks. Potential options identified by CIAT's LINK methodology[11] which includes: farmer organizations, intermediaries, processors (such as the case of oil palm), buyers, or honest brokers (NGOs). At present, this role has been filled in the Peruvian Amazon, with mixed success, by coffee and cocoa exporters/processors, oil palm processors, projects, and in some cases, cooperatives.

[11] Lundy, M., G. Becx, N. Zamierowski, A. Amrein, J. J. Hurtado, E. E. Mosquera, and F. Rodríguez (2012). Metodología LINK: Una guía participativa para modelos empresariales incluyentes con pequeños agricultores. Centro Internacional de Agricultura Tropical (CIAT), Cali, Colombia (Publicación CIAT No. 379).

Input suppliers and middlemen/stockpilers are other potential candidates for this role, but administrative and transaction costs, available capital and cash flow, risk, and the lack of experience and knowledge in providing these services are likely barriers to the assumption of the role of articulator by these actors and will affect the services provided.

Credit: A principal assumption of the PPC is that difficult access to credit limits farmer investments in agricultural productivity and thus decreases agricultural sustainability and increases deforestation. At present, credit access and use in the Peruvian Amazon is very low, since only approximately 20% of the small or medium-sized farmers use credit (Robiglio et al., 2016), mainly due to the high cost of credit (a minimum of 18% annually). Furthermore, the majority of credit is used for commercialization, not production.

A positive aspect of credit is that various public and private financial institutions are in the process of "greening" their credit procedures and portfolios, which has a high potential to promote the PPC approach.

The node-network-articulator model above suggests that farmer aggregation can reduce credit costs and risks by aggregating farmer credit at the node level and managing a credit trust fund at the network level. However, a number of questions exist related to whether an articulator would be willing to assume the costs of administering group credit or the risk of credit default by the nodes, as well as the nature of loan guarantees at the individual farmer or node levels, especially considering that many farmers do not have land titles. In the latter case, a hierarchical system of guarantees might be useful, whereby individual guarantees based on crop plantations could be combined with solidarity guarantees at the level of the node or network.

Other measures to reduce risks and transaction costs, hence the cost of credit, potentially include:

- better land use classification by the regional governments in order to guide crop siting,
- the use of communication and information technologies – fintech - for processing credit applications (e.g. FarmDrive in Kenya, https://farmdrive.co.ke/about-us) or reducing risk (e.g. block chains)
- the development and use of credit portfolios that group certain types of loans in order to reduce risk,
- real-time crop monitoring afforded by low-cost remote sensing technologies (at a cost of about $25/ha/monitoring event),
- crop insurance,
- Loan guarantees offered by different local (e.g. FOGAPI), regional (e.g. FONDESAM – regional government funds), or international programs (e.g. the DCAs under the aegis of USAID, or loan guarantees offered by multi-lateral international banks such as CAF).

Nevertheless, with the exception of the last, there is little experience with most of these options in the Peruvian Amazon. Much more conceptualization and development is required , as well as the combination of funds (e.g. public funds, international cooperation, private investment funds, future purchase orders, etc.) that can be used to leverage the unique attributes of each in order to reduce risk and credit costs. Moreover, new mechanisms of fundraising, such as peer-to-peer lending and crowdfunding investments based on the internet need to be conceptually explored and piloted in the context of small farmers.

It is also uncertain whether expanded credit availability and use per se would result in greater sustainability and less deforestation. One could argue that greater productivity stemming from credit use might incentivize more land clearing, as part of farmers´ strategy to increase income. This suggests that the use of inputs and technologies, enabled by greater access to credit, need to go hand-in-hand with measures to reduce deforestation, such as conditioning credit to on-farm forest ➡

conservation or systems for monitoring and enforcement of restrictions on deforestation.

Market pull and linkages: Underlying assumptions related to markets in Peru are that coffee and cocoa markets (but not oil palm which is a more traditional commodity) are different from standard commodity markets such as those for soy and beef in Brazil, due to the greater emphasis on product quality and the complexity and multiple actors involved in values chains. It is also assumed that markets for high quality, low deforestation coffee and cocoa exist, and that the pull (i.e. higher prices) of these quality-based markets will be sufficient to motivate changes in production practices on relatively large scales.

In fact, coffee or cocoa do not yet form part of the mainstream sustainable commodities movement driven by large multi-national businesses or commercial fora such as
Unilever or the Consumer Goods Forum, although commercial demand for sustainable coffee and cocoa is increasing (e.g. Nestle). Markets for coffee sourced from Peru continue to emphasize bulk purchases of standard or improved quality (based on sourcing from zones known for their coffee quality), with little regard to attributes of sustainability. A similar situation exists for cocoa, although markets are more segmented into different, quality-related categories (Scott et al., 2015), but with little consideration of sustainability. Market niches for reduced-deforestation coffee and cocoa therefore are still small and of difficult access.

Given the incipient nature of these markets, they may not offer improved prices to farmers in the near future. Nevertheless, the income of farmers participating in the PPC should benefit from improvements in productivity and product quality as a result of improved TA, credit, and input use, at the same time that these improvements incentivize forest conservation. Eventually, the development of regional brands partially based on deforestation reductions may stimulate demand, sales, and income from reduced-deforestation products, but this process will require time as well as jurisdictional monitoring and monitoring of deforestation to reduce risks to small farmers posed by corporate sourcing policies based on zero net deforestation (Nepstad et al., 2016).

At the same time, the relatively small numbers of large coffee and cocoa buyers suggest that efforts to convince them to include considerations of reduced deforestation in their purchasing policies may be feasible. Given that concerted public pressure for changing corporate policies are largely absent in Peru, an international strategy aimed at large buyers, based more on incentives (e.g. drawbacks or other tax incentives) and translated at the national level to their local subsidiaries and supply chain partners, or a more direct relationship between producers and final purchasers, is needed.

Once achieved, the relatively low cost emissions reductions from the forestry and land use sector in the Peruvian Amazon could contribute to the competitiveness of Peruvian products such as coffee or cocoa in markets that value that attribute. Additionally, under a hypothetical national system of emissions compensations, emission reductions achieved in the Peruvian Amazon could be used to help achieve the carbon neutrality of products produced elsewhere in Peru (e.g. agricultural export products produced on the coast), and hence increase their international competitiveness.

Forest Conservation: A principal challenge of the PPC is to show how forest conservation can be synergistically combined with increased production by small farmers with weak linkages to small markets that value sustainability and reduced deforestation, especially considering that conservation may result in reductions of income of farmers who are land limited.

Within this context, conservation needs to be viewed from a jurisdictional level, since it opens a number of possibilities for conservation activities that can be integrated in the landscape. Possibilities for increasing jurisdictional level conservation within a landscape include:

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• Macro scale: forest land use classification and zoning as an enabling condition for forest conservation, the establishment of effective systems of land use monitoring and control, the assignment of forest usufruct rights that include conservation as a condition, the establishment of branding based on reduced or zero net deforestation, participation in product certification systems that include forest conservation as an attribute, incentives for reforestation.
• Meso scale: sustainable management of indigenous territories, the consolidation of protected areas, biological corridors, conservation concessions, municipal incentive programs for conservation by farmers.
• Micro scale: conditioning credit to on-farm forest conservation, incentive programs for on-farm conservation, in certain circumstances demonstrating how forests are functionally and economically related to production systems (e.g. as a source of water or pollinators or as erosion barriers).

A principal barrier to forest conservation is the low opportunity cost of forests compared to alternative land uses. The value of forests, hence their conservation, may be increased by "carrots" such as payments for forest maintenance, higher prices for (certified) agricultural products that are associated with forest conservation, and/or by conditioning benefits, such as credit, to on-farm forest conservation.

Alternatively, "sticks" such as mandatory requirements for forest conservation linked with sanctions for forest loss may be less viable in the Peruvian context where enforcement capacity is weak.

Incentives are the most direct approach and have been emphasized at the international level. Peru is participating in programs based on forest emission reductions such as REDD+ or results-based payments such as those of Germany and Norway, the World Bank´s Forest Carbon Partnership Facility Carbon Fund, or the incipient Green Climate Fund. Many of these programs focus on complicated changes in the institutional, policy, and legal frameworks at the national or large-scale

jurisdictional levels that require long periods of gestation. If successful, these programs should improve the assignment of land classification, rights, and the monitoring, control, and enforcement of its forest lands and greatly decrease deforestation, on the order of 65% of Peru´s emission reductions goal.

Other measures such as consolidating protected areas (especially buffer zones), indigenous lands, reforestation, and forest maintenance on large farms, are expected to contribute only about 25% to Peru´s USCUSS emissions goal, while the use of abandoned lands for projected new coffee and cocoa plantations will contribute another 13%.

These performance-based programs avoid the question of how to finance up-front the institutional, legal, governance, and productive changes needed in order to reduce deforestation. In the end, Peru will have to bring together the sizeable but under-utilized institutional and other investment capital available for green investments with end-users of capital such as small farmers, agri-entrepreneurs, and local governments who are presently unable to fulfill investment criteria related to risk, scale, and guarantees.(por ejemplo, FarmDrive en Kenia, https://farmdrive.co.ke/about-us).

Table 9. Suggested characteristics of a jurisdictional PPC monitoring system

• Simple: focusing on three or four key issues initially, but becoming more complex over time
• Easy and inexpensive to implement/monitor: building on existing monitoring systems
• Focusing on performance, not practices: featuring the measurement of jurisdiction-wide performance, not the means for achieving that performance
• Home-grown: aligned with, owned and developed by the rural sectors of each region
• Compatible with international standards/commitments: compatible with, and supportive of, the standards (for example, commodity roundtables, Forest Stewardship Council and REDD+ safeguards), processes (for example soy and beef moratoria and Consumer Goods Forum 2020 agenda) and commitments (for example Unilever sustainability goals) that have been developed within sustainable supply chain initiatives
• Progressive: encouraging improvement over time, with clear incremental steps towards higher performance
• Scalable: designed to easily scale across the hierarchy of jurisdictions (from counties, to states, to nations)

Source: INOBU, EU REDD Facility (2016)

Monitoring: The design of a monitoring system for the PPC should be based ideally on indicators and targets arrived at by consensus among major stakeholders. Besides monitoring program performance, monitoring can also help improve investor confidence and reduce risks.

It is likely that monitoring system indicators will include social, economic, and environmental variables at different spatial scales. Since information gathering and analysis has a cost, the system should be based on existing information or easily gathered data whenever possible. Suggested characteristics of a jurisdictional PPC monitoring system are shown in the Table below.

The system should enable the assessment of progress towards performance targets. It should also be linked to an institution that has the authority to recommend or design the changes that the performance indicators show are needed.

In Peru, a possible starting point for a performance monitoring system is the evolving set of indicators (e.g. deforestation, production, equity) that will form the basis of regional branding. The country also performs annual forest monitoring via satellite and also has an early warning system for deforestation (GeoBosques of MINAM, geobosques.minam.gob.pe:81/geobosque/view/alertatemprana.html) that can be adapted for PPC monitoring.

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Conclusions

Agriculture and land use in the Peruvian Amazon is dominated by small, dispersed, unorganized, and informal farmers with little capital and weak market linkages, who exist in a context of weak forest and land use governance and complex value chains. These characteristics create a number of challenges for the PPC due to: the difficulties of using market pull and stakeholder pressure as driving forces for behavioral change; the lack of governance and financing for establishing enabling conditions for sustainable land use, improved and more sustainable productive systems, and incentives forest conservation or reforestation; and the high costs and administrative and legal barriers for achieving formalization.

The Peruvian Amazon is at an early stage of dealing with deforestation and improved agricultural productivity. Although the overall objectives and architecture are clear, the steps needed to achieve those goals are less so. Our analyses suggest that in the short and medium terms the main challenges are the inter-related processes of aggregating farmers, providing incentives, linking production and demand for high quality sustainable products, and improving land use governance and enforcement. More accessible credit conditioned to reduced deforestation is a key, multi-purpose incentive for promoting farmer aggregation, improving production, increasing the marketability of agricultural products, and promoting conservation. Credit should be accompanied by farmer aggregation and the use of TA and other services, technologies, and inputs since they enable greater productivity and income and represent a step towards expanding into more demanding markets based on reduced deforestation in the future.

This suggests that attention needs to be focused on consolidating and expanding the incipient multi-stakeholder platforms involving buyers, producers, credit suppliers, and government representatives who are working on developing regional brands based in part on reduced deforestation.

In order to ensure that productivity improvements do not drive further deforestation, and to ensure a solid basis for investments and increased conservation, more needs to be done in the medium and long terms to improve land use governance (e.g. land use classification and zoning, assignment of rights, monitoring and enforcement).

Since this task is more problematic, given the limited capacity of regional and local governments, governance, especially land use monitoring and enforcement, may have to be shared with private sector actors such as buyers and credit institutions.

Financing these changes is critical and is addressed in a subsequent paper. Although, farmer aggregation, credit, and TA have the potential to be self-sustaining, external funding may be needed to "prime the pump". In addition, substantial public investments may be needed to provide the conditions that enable and support private investments and access to capital, as well as incentives for those investments. It seems unlikely in the case of Peru that the global sustainable supply chain agenda can help finance and transform production systems in short and medium terms, since the principal crops associated with deforestation, coffee and cocoa, do not form part of that agenda, at least for now.

On a more general level, the main lessons from integrated conservation and development projects (Brandon and Wells, 2009) need to be reinforced in the context of the PPC, including the need for multi-stakeholder participation and governance, adaptive management, adequate long-term funding, the establishment of an effective strategy, realistic goals and activities in-line with the capacities of actors, and enforcement capacity.

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