



WAGENINGEN UR

*For quality of life*

**Brazil nut concessions in the Peruvian Amazon, fifteen years later: success or failure?**

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November 2017

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## Acknowledgements

Many people made meaningful contributions to this thesis. I would like to thank, in no particular order, all of them as their inputs were very useful. Thanks to my supervisor Verina Ingram for providing continued guidance on the different products associated with the thesis—even when the time-slot was really short. To Manuel Guariguata, my contact person and advisor from CIFOR Latin America office, for providing the subject of this thesis, for its valuable insights in Brazil nut concessions, and rich comments on the thesis report.

At CIFOR office from Lima, thanks for providing research budget and to the people working there for making it a pleasant place to work at, in a stimulating atmosphere. Thanks especially to Monica Aleman for hosting and introducing me in the Lima daily life.

Thanks to the Peña and Pastor family for introducing me in the network of Brazil nut concessionaires and experts, for their on-going encouragement, for making me part of their family and discover the beauty of Puerto Maldonado. I would like to express my gratitude to Miguel Zamallova, president of the association RONAP, and Angel Félix ex-official from Profonanpe, for the time they dedicated introducing me to most of the concessionaires I have interviewed and for their key insights in the Brazil nut concessions.

Thanks to the fifty Brazil nut concessionaires interviewed, for taking time telling me their story and without who this thesis would not be possible. Special thanks for the concessionaires Berlinda Arias de Simplicio for her generous support during the visit to Alerta and introducing me to its agroforest system in her concession, Juan Saavedra Meza, Eulogio Quispe Chani, and Ronaldo for introducing me into their concessionaires network, and Manuel Gudy Cavera for inviting me in its concession and making the visit of ASCART.

Thanks to the different authorities' officials Gaston Chucos from SERFOR, Carlos Salazar, Jhonny Fernandez and Jose Saavedra from the Regional Directorate, Romulo de la Cruz, Jesus Flores and colleagues from OSINFOR, Salvador Morales from MINAM and Ernesto Fernandez from SERNANP, for their valuable insights in the Brazil nut concessions and the provision of data used in the thesis. To the different interviewed experts from NGOs; José Luis Capella and Luisa Ríos from the NGO SPDA, Brandi Gatica from the NGO Chesvi, Juan Loja from the NGO ACCA, for their explanation on the context shaping Brazil nut concessions. Gilber Martín, Daniela Alfaro and Mikel Manrique from Profonanpe for inviting me in their workshop with Brazil nut concessionaires and for their insights in the Brazil nut concessions.

Thanks to the representative of the Brazil nut company Candela in Puerto Maldonado, Carolina from the firm Candor-Latan and Misael Valera from ASCART for their insights in the relationship between Brazil nut concessionaires and Brazil nut firms.

Thanks to Julia Quaedvlieg, Fidel and Merel from the research project Sustain for their contact information.

And the last but not the least, my father that although not always understanding the point of what I am doing, keep being the more interested person in my work and the strongest source of support and motivation. My thanks to my mother and Willem family for their love, encouragement and support. To my friends and their ability to make me relax with a good Belgian beer even in the most stressful moments.

## Abstract

Brazil nut concessions in Peru represent an illustrative case of concessions devised for non-timber forest products instead of timber logging and contributing to rural development. The first Brazil nut concessions were granted in 2002, two years after the forestry reform that established the concession model in the country for the sustainable use and conservation of forest resources. This study analyses if the Brazil nut concessions system promotes the aim of this reform fifteen years after its implementation. The comparison of the conditions enabling this goal between Brazil nut concessions in permanent production forests and in the National Tambopata reserve demonstrates that different institutional arrangements shaping the same resource lead to different governance outcomes. For permanent production forests, issues related to the institutional arrangement, the Brazil nut concessionaires and the forest products chains compromise the sustainable use of Brazil nut forest resources. The findings confirm common issues associated to NTFP management and small-scale producers such as regulatory burden, vulnerability against more powerful actors, and lack of intervention from state agencies, and issues commons to forest concession systems worldwide such as poor law enforcement. Although the concession contract is often used as a strategy for sustainable forest management in forest rich countries, this study shows that it is unlikely to work when issues exist in the institutions that regulate the system, and in the socio-political context where it is implemented.

Keywords: Forest governance, forest concessions, non-timber forest products, smallholder harvesters, forest policies

## Introduction

Contribution of forest governance to forest sustainability has led to the concept of successful forest governance, defined as exercising authority and developing institutions to maintain forests in good condition with respect to the given biome, ecosystem functions, species composition and human needs (Tucker 2010). Although there is no consensus on successful property rights regime that performs better for sustainable forest management (SFM) (Ojanen et al. 2017, Tucker 2010), the use of forest concessions has been proven particularly relevant in remote areas with low population density and weak intervention from forest authorities (Karsenty et al. 2008, Singer and Karsenty 2008).

Forest concessions are present in tropical, temperate and boreal forests (Karsenty 2016). They have been particularly important in tropical countries when the state lacked the capacity to conserve large forest areas (Gray 2002). In these areas, the concession contract came as a solution by clarifying land tenure and establishing conditions that constrain the concessionaire to enforce SFM (Balbinotto et al. 2012, Gray 2002, Karsenty et al. 2008, Singer and Karsenty 2008). For this reason, forest concessions are still a popular strategy of forest policy decision-makers for sustainable forest management in forest rich countries (Balbinotto et al. 2012, Karsenty et al. 2008, Singer and Karsenty 2008). This is the case of Peru where the government established the concession model in 2000, with the objective to promote the “sustainable use and conservation of forest resources” (Article 1, 10, 31 Ley forestal y de Fauna Silvestre N°27308).

Yet forest concession systems poorly designed and implemented are not able to solve the problems they are intended to (Balbinotto 2012). In relation to this, forest concessions

worldwide have often been criticized for recurrent problems associated with design failures e.g. bribery and corruption in the allocation of the concessions, concessions size too large or periods too short for sustainable forest management- and implementation failures such as lack of monitoring and inadequate mechanisms for law enforcement (Azavedo-Ramos et al. 2015, Balbinotto et al. 2012, Ferraz and Seroa da Motta 1998, Karsenty et al. 2008). These failures correspond to weaknesses of forest governance in the tropics and often result from socio-political problems in the country (Singer and Karsenty 2008). Therefore, any implementation of forest concessions system requires a careful analysis of the institutions that regulate the system (Balibonotto et al. 2012), and the socio-political context where it is implemented (Singer and Karsenty 2008).

Despite the importance of non-timber forest products (NTFP) to rural development (Arnold and Pérez 2001, Ingram et al. 2015, Laird et al. 2010), forest concessions are usually granted for industrial logging (Karsenty et al. 2008). Notable exception to this are the community concessions for multiple forest management in the Guatemala's Maya Biosphere Reserve (Radachowsky et al. 2012), and Brazil nut (*Bertholletia excelsa*) concessions in Peru (Perales and Guariguata 2015). Although the first ones have been subject to a complete revision on their evolution since their implementation (Radachowsky et al. 2012), this is still missing for Brazil nut concessions. The aim of this paper is to fill this gap considering that the importance of Brazil nut concessions for forest and rural development justifies a revision of this system. Brazil nut plays indeed a key role in rural livelihood and forest conservation in the region of Madre de Dios where 1223 Brazil nuts concessions<sup>1</sup> are currently granted, covering an area of approximately 995 590 hectares of natural forests (Chavez et al. 2012). A common debate about forest concessions is whether small-scale companies are more suitable than large concessions for achieving sustainable forest management and socio-economic benefits (Hobley 2007, Karsenty et al. 2008). Brazil nut concessions present a middle-ground solution as they have been granted to small forest users for area up to 10000ha over a renewable period of 40years.

Based on the definition of Tucker (2010) on successful forest governance and the goal of the implementation of forest concessions in Peru, this study seeks to answer the following question: Does the Brazil nut concession system promote the sustainable use and conservation of Brazil nut forest resources? In doing so it aims to contribute to literature on forest concessions in the tropics and their role in forest sustainability.

## Background information

### Production system

Peru is the second country with largest contribution to Brazil nut exportation worldwide (contribution of 17% in 2013), positioned after Bolivia and in front of Brazil (respective contribution of 77% and 6% in 2013) (Euroecotrade 2014). In Peru, Brazil nut forests cover an area of roughly 2,500,000ha in the department of Madre de Dios, in the extreme southeast of the Amazon River basin (Escobal and Aldana 2003, Cossío et al. 2011). Although the maximal area for a Brazil nut concession is 10 000ha, the average size is 860 ha, the smallest registered concession covers 24,23ha and the largest one covers 4373,8 ha<sup>2</sup>. It only involves natural stands of forest, as plantation of Brazil nut trees doesn't allow significant yields for market (Kalliola

and Flores 2011). Brazil nut forests are characterized by large Brazil nut trees of over 40m, and present a low abundance of juveniles (Guariguata et al. 2017). Despite this, it has generally been argued that Brazil nut collection is a low impact activity whose intensity is uncorrelated to the regeneration potential of the tree (Cossio et al. 2011, Guariguata et al. 2017). Brazil nut concessionaires live in the city of Puerto Maldonado, capital of Madre de Dios or in villages closed to the Interoceanic highway connecting Puerto Maldonado to Brazil. They work in the concession for the harvest season (locally named *zafra*) between January and April (Kalliola and Flores 2011). The term “*castaño*” is used to designate Brazil nut harvesters. A term that concerns Brazil nut concessionaires but also native communities and private smallholders having access to Brazil nut forest (Perales and Guariguata 2015).

### Concession granting process

Specific regulation for the extraction of NTFP appeared in the law N° 21147 (1975) with a system of renewable permit granted for one or two years, for forest areas up to 10000ha. The system of permit, also applied for timber, had led to unsustainable forest management with the near extinction of certain timber species (Escobal and Aldana 2003, Galarza and La Serna 2005, Smith et al. 2006). In response to this, the government established in 2000 the concession model through the forestry law 27308 and in 2001 its Supreme Decree 014-2001-AG (Galarza and La Serna 2005, Smith et al. 2006). With the implementation of secure tenure rights and management plans, the system of concessions appeared as the first incentive for sustainable forest management (Galarza and La Serna 2005, Smith et al. 2006).

Protestations from members of the timber industry on the concession reform made the implementation of the first Brazil nut concessions delayed until 2002 (Smith et al. 2006). For the allocation process, priority for the attribution of the concession was given to Brazil nut collectors who could demonstrate the economic and social function of the solicited land (Cossío 2011, Peña 2010). Observable works on land such as campsite, walking paths, or even presence of agricultural area were used as prerequisite for land allocation and as criteria for the delimitation of the concession (Ríos 2010). To compensate the lack of resource from regional government to manage all procedures, several NGOs appeared in the Brazil nut sector to assist Brazil nut harvesters for the delimitation of the concessions. However due to the lack of technical capacity and funds, this process has often been characterized as incomplete or unprecise (Chávez et al. 2012).

The forestry law 27308 classified Peruvian forest into six categories: production forests, forests for future uses, forests in protected areas, protected areas, forests on native and communal lands, and local forests<sup>3</sup>. Production forests are classified into permanent production forests comprising timber concessions and concessions for non-timber uses, and production forests in reserve comprising only concessions for non-timber uses that do not affect the timber resources. The Brazil nut sector in Peru has experienced a massive granting of concessions in record time, with more than 800 concessions granted in the first four years. To date, 237 Brazil nut concessions are allocated in permanent production forests in Tahuamanu province, 884 in Tambopata province and 2 in Manu Province<sup>4</sup>. In addition to this Brazil nut concessions have been allocated in production forests in reserve: 85 concessions in the Tambopata National reserve, and 13 in the buffer zone of the Bahuaja Sonene national Park<sup>5</sup>.

## Condition of the concessions

Table 1 describes the different functions related to Brazil nut concessions held by the forestry authorities. At the local level, the administrative functions are held by the Regional Directorates of Forestry and Wildlife (DRFFS), while the monitoring of the concessions is done by the decentralized office of the National Forestry and Wildlife Service (OSINFOR) in Puerto Maldonado, an independent institution that responds directly to the Presidential Council of Minister (Kowler et al. 2016). For the production forests in reserve the National Natural Protected Areas Service (SERNANP) has complete responsibility regarding Brazil nut concessions.

Table 1: key responsibilities associated to the Brazil nut concession system held by the forestry authorities in Peru.

Forest categories	Level	Forestry authorities	Functions related to the concessions
Permanent production forests	National	Ministry of Agriculture (MINAGRI)	<ul style="list-style-type: none"> <li>• Determining and changing the best-use classification for soils</li> <li>• Identifying and authorizing the change of current soil use</li> </ul>
		MINAGRI - National Forestry and Wildlife Service (SERFOR) Created in 2014	<ul style="list-style-type: none"> <li>• Regulating and promoting the sustainable use and conservation of forest resources</li> <li>• Formulating norms for the authorization of forestry concessions</li> </ul>
		Monitoring Agency for Forest Resources and Wildlife (OSINFOR), Independent of the MINAGRI since 2009	<ul style="list-style-type: none"> <li>• Monitoring and controlling compliance of concessions with forest management plans and concession contracts</li> <li>• Sanctioning non-compliance</li> </ul>
	Regional	Regional Directorates of Forestry and Wildlife (DRFFS) Part of the MINAGRI and gained most functions since 2010	<ul style="list-style-type: none"> <li>• Authorization and cancelation of the concession contracts</li> <li>• Administration and authorization of forestry concessions management plans</li> <li>• Visual control of the Brazil nut concessions prior to the authorization of complementary timber management</li> </ul>
Production forests in reserve	National and decentralized offices	National Natural Protected Areas Service (SERNANP)	<ul style="list-style-type: none"> <li>• Approving forestry concessions, permits and authorizations</li> <li>• Monitoring and control of Brazil nut concessions</li> </ul>

Source: Adapted from Forestry Law No 29763, Kowler et al.2016, Peña 2010

Brazil nut concessions in Peru are granted for a renewable period of 40 years and a maximal area of 10 000 ha (Peña 2010, Cossío et al. 2011). The concessionaires have exclusive rights on their concessions (Peña 2010, Cossío et al. 2011). Only the Brazil nut concessionaires in permanent production forests have alienation rights to transfer the concession. Concessionaires with concessions in production forests in reserve get the authorization to enter in their

concession during the preparation of the harvest season (November-December) and during the harvest season (January-March)<sup>6</sup>. Any additional visit during the rest of the year needs to be justified and to request the authorization from the SERNANP. The harvesting and burning of Brazil nut trees is prohibited since 1981 (Cossío et al. 2011, Perales and Guariguata 2015).

Table 2 summarizes the different management plans for the Brazil nut concessions in both types of production forests. The last changes in the Brazil nut concession policies occurred with the law N°29763 implemented in 2015. These changes aimed to promote and simplify the management of products with low environmental impact such as Brazil nuts. The annual operational plan (POA) was replaced by the declaration for management DEMA. The DEMA stays similar to the POA in the fact that it reports an estimated volume of Brazil nuts previous to the harvest season that needs to be approved by the DRFFS prior to the harvesting. This despite of the fact that Perales and Guariguata (2015) demonstrated that this annual pre-approbation is not statistically relevant nor useful for management purposes due to the annual instability of the production. Yet, a notable change is that the DEMA can be signed by the concessionaire alone and doesn't need to be filled every year.

Although the concessions were first allocated for Brazil nut as the primary use, the government allows since 2004 the Brazil nut concessionaires in permanent production forests to harvest timber through an annual complementary management plan (Cossío et al. 2011). This was replaced in 2014 by the actual intermediate management plan. The approbation of these plans requires a prior control on their information in the concession from the Regional Directorates. The law 29763 created a system of regency which makes a registered forester accountable for the elaboration and application of the intermediate management plan. The rationale beyond this change was to decrease illegal timber activities in concessions by sharing responsibilities between the concessionaire and an official regent from the forest sector. Guariguata and Rockwell (2015) provided scientific evidence that a low timber harvesting intensity of 2 individuals per hectare doesn't affect the production of Brazil nut trees. Despite this, the *Resolución de Dirección Ejecutiva N°161-2016-SERFOR-DE* stipulates that the maximal intensity of timber harvesting in the Brazil nut concessions is 5m<sup>3</sup>/ha but the concessionaire can opt for the quota of 2 individuals per hectare that is based on scientific evidence.

In the production forests in reserve, one master plan is established every five years for all the area. Brazil nut harvesters also had to fill a POA until it was abolished in 2014 (Perales and Guariguata 2015). Now the concessionaires only need to fill a declaration before the harvest season informing on the material they carry out and number of workers to get the authorization to enter in the concession and collect Brazil nuts. At the end of the harvest season the concessionaire has to inform the control post of the reserve on its production in order to get the transport permit (Perales and Guariguata 2015). Concessionaires have to fill an annual report around November informing on the total volume of Brazil nut extracted, payment for Brazil nut harvesting right and any observations made by the concessionaires<sup>6</sup>.

Table 2: Description of management plans for Brazil nut concessions since their implementation

Type of forest	Law	Norm	Year	Management Plan	Description
Permanent production forests	Law N°27308	Resolución Jefatural N° 224-2002-INRENA.	2002	Forest General Management Plan (PGMF)	Long term management plan for the planning of the whole concession area for its validity period.
		Resolución Jefatural N° 224-2002-INRENA.	2002	Annual Operational Plan (POA)	Short term management plan for the annual planning of the working year. It contains the inventory of the Brazil nut producing trees and the solicitude for the estimated volume of Brazil nuts to mobilize.
		Resolución Jefatural N° 055-2003-INRENA.	2003	Annual Management Complementary Plan (PMCA)	Short term management plan for the annual planning of timber extraction activities for the solicited year.
	Law N° 29763	Resolución de Dirección Ejecutiva N°170-2015-SERFOR-DE.	2015	Management declaration DEMA	Simplified management plan for short to middle term planning (1 to 5years). Only applicable for low intensity extracting activities not resulting in the loss of the individual. It contains the description of silvicultural activities and the solicitude for the estimated volume of Brazil nuts to mobilize. Don't need to be endorsed by a regent
		Resolución de Dirección Ejecutiva N°013-2016-SERFOR-DE.	2016	Intermediate Forest Management Plan (PMFI)	Long term management plan formulated for the planning of the whole concession area and when the concessionaire wants to apply complementary activities such as timber extraction, ecotourism, or conservation. Need to be endorsed by a regent
Production forests in reserve	Law N°26834	Decreto Supremo N°038-2001-AG.	2001	Master Plan of the Tambopata National Reserve  Master Plan of the Bahuaja-Sonene National Parc	Management Plan for the whole protected area for a renewable period of 5 years and gathering together all the concessionaires. It contains for the whole protected area the model of contract for Brazil nut concession, the management plan for brazil nut extraction, and the resolution for the extraction of Brazil nut

Source: Peña 2010, Art. 58 the forestry law No 27308, Law No. 26834 on Natural Protected Area, Art. 56 of the Forestry Law No 29763

## Conceptual framework

It is widely recognised that the sustainable management of NTFP depends upon the way they are governed (Ros-Tonen and Kusters 2011, Tieguhong et al. 2015, Wiersum et al. 2014). Forest governance, according to the definition of Ros-Thonen and Kuster (2011), encompasses *decisions on how and to what ends forests are managed, who are involved in these decisions, and what is done to enforce forest laws and policies on the ground*. In relation to this, the system of forest concessions, as a form of forest governance, involves allocated public forest land and resources through a concession contract that provides formal property rights to the

concessionaire which is subject to sustainable management activities (Balbinotto et al 2012, Karsenty 2007). The two main actors involved are therefore the rights granter- the state- and the rights receiver-the concessionaire- although in some cases additional stakeholders such as NGOs and local communities are also involved (Singer and Karsenty 2008).

Distinction can be done between the ‘old’ system of concessions implemented in Africa during colonial time in the late 19<sup>th</sup> and early 20<sup>th</sup>, and the ‘modern public-private’ partnership’ system currently applied in different parts of the world (Karsenty 2007, Karsenty et al. 2008, Singer and Karsenty 2008, Van Hensbergen 2016). The previous system was under colonial rules from Western governments that gave concessions over large areas with the right for the company to use natural resources as private assets (Karsenty 2007). After countries gained their independence and due to economic crisis, concession size got smallest and the vertical relation between the state and concessionaires progressively shifted to the modern “public-private” partnership. In relation to this, concessionaires gained new responsibilities previously assigned to the government such as the management (control rights) of production forests (Karsenty 2007).

Especially, concessionaires were assigned gradually with social obligations; first sporadically during the 1960s and 1970s, through reforestation plantations and rural area modernization. Nowadays, public regulations make the concessionaires accountable for social and environmental obligations, through the delivery of local public goods for the general interest (Karsenty 2007, Karsenty et al. 2008, Singer and Karsenty 2008). Such public goods and services include schools, health centres, provision of local jobs, road maintenance, etc. (Karsenty et al. 2008). In Latin America the system of concession was implemented after the reforms liberalizing policies in the last 20s, it therefore only experienced this model of “public-private” partnership (Singer and Karsenty 2008).

The conditions of the concessions still vary in different countries in terms of their size, responsibilities and durations (Van Hensbergen 2016, Karsenty 2007). Choices made by governments depend among others on population density, access to forests and transports costs, local inhabitants’ preferences and traditions (Karsenty 2007). For instance, Brazil nut concessions are not associated with the responsibilities to provide public goods as they are directly granted to small-scale harvesters instead of large companies.

Contribution of forest governance to forest sustainability has led to the concept of successful forest governance. According to the definition made by Tucker (2010), forest governance is seen as successful if it contributes to the sustainability of a socio-ecological system. In other words, to be successful, forest concessions, and in this case, Brazil nut concessions, should promote the sustainable use and conservation of forest.

Despite many studies seeking to identify governance principles leading to successful outcomes of forest governance, it is well acknowledged that no formula exists (Agrawal 2008, Tucker 2010). Rather, scholars on the commons have demonstrated that forest governance outcomes result from interactions between a large number of factors and are context-dependent (Agrawal 2001, 2007, 2008, Dietz et al. 2003, Gibson et al. 2005, Tucker 2010).

According to the author von Halle (2014), all factors influencing forest governance outcomes can be grouped into three essential components (the institutional arrangements, characteristics of the forest users, characteristics of the forest products chain) and a variety of external components (e.g. corruption, intersectoral influence, international conventions, etc) (figure1). This model makes a distinction between external and essential components as it assumes that

the analysis of factors from the essential components, within the historical and current context, is sufficient to make a first assessment of the quality of local forest governance. By essential, this framework assumes that if there is no intervention to resolve problems identified in these three components, the local governance quality will be low and can hardly promote the sustainable use of forest (von Halle 2014). Local refers to the analysis of actors and institutions that are in closer relation with the forest. Based on the assumption of von Halle (2014), the analysis of the Brazil nut concession system has been framed into the three essential components adapted for this case study: the institutional arrangements, characteristics of Brazil nut concessionaires, and characteristics of the timber and Brazil nut chains. This framework is used as it fits with scholars' theory on NTFP governance; that it is more than rule-making, it is based on institutional arrangements, customary norms and market-based norms (Ingram et al. 2014, Ros-Tonen and Kusters 2011, Wiersum et al. 2014). The division of the three categories for the analysis also fits with scholars' arguments on the evaluation of forest concessions; that it requires a careful analysis of the institutions that regulate the system (Balbinotto et al. 2012), and the socio-political context where it is implemented (Singer and Karsenty 2008).

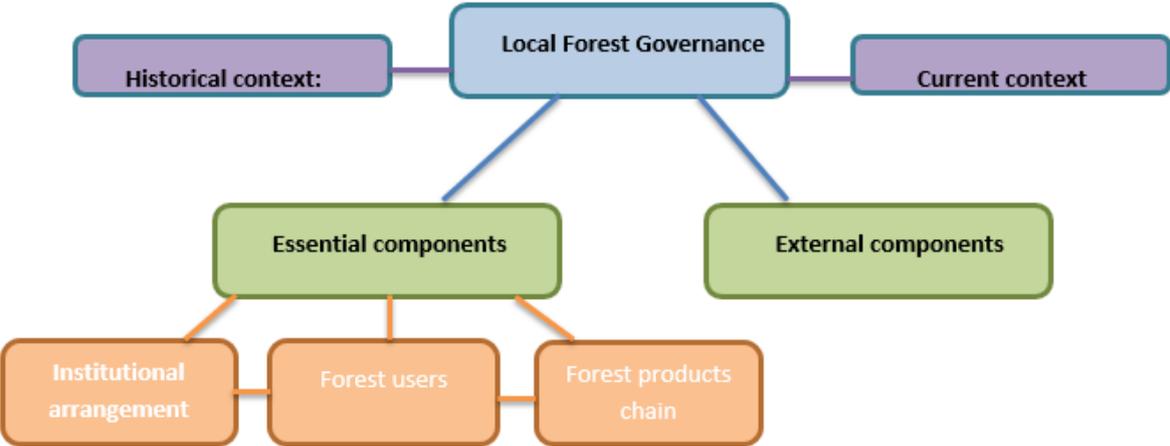


Figure 1: Local forest governance framework by von Halle (2014)

The institutional arrangement covers the property-rights systems, institutions and law enforcement mechanisms. Although no formula exists for successful forest governance, scholars have identified conditions within these three institutional aspects that are conducive to sustainable forest management (Agrawal 2001, Tucker 2010).

“Institutions” are rules in use; they establish what people may do, must do, or must not do in a specific situation (Tucker 2010). What makes the system of concession successful is also about the mobilization of local harvesters for or against concessions rules, how much they are supported, and recognized as legitimate (Singer & Karsenty 2008, Tucker 2010). As a result, Institutions need to feed the local context by not restricting forest dependent people from sustainable use to forest resources. Forest laws and regulation should respect local harvesters’ needs, their local technical and cultural preferences so they can benefit sustainably from the forest (Tucker 2010). It is well appreciated that when decisions on rules result from a participatory process, they are more likely to be seen as legitimate and respect local needs (Mayers and Vermeulen 2002, Ostrom 1990, Ros-Tonen and Kusters 2011, Tucker 2010).

Law enforcement has widely been recognized as a necessary condition for the sustainable use of forest resources (Gibson et al. 2005, Tucker 2010, Gray 2002). A risk associated with forest concessions is that the state transfers its responsibility over forest management to a concessionaire that may have other incentives than do it sustainably (Balbinotto et al 2012). Effective means to avoid this, are regular monitoring by the monitoring agency (Gray 2002, Karsenty et al. 2008, Tucker 2010) and law enforcement strategies that allow to detect forest crimes and incentive law compliance by forest users (Azavedo-Ramos et al. 2015, Ferraz and Seroa da Motta 1998, Kishor and Rosenbaum 2012).

Security of forest users' rights is a key aspect for the forest governance to ensure the sustainable use of forest (Gray 2002, Mayers and Vermeulen 2002, Tucker 2010). Forest users' rights are often understood as tenure rights and refer to the access and management of the resources, as well as exclusion rights (Mayers and Vermeulen 2002). Secure tenure rights involve clearly defined boundaries, an effective mean for the forest users to protect forest from outsiders and incentive long-term management (Mayers and Vermeulen 2002, Ostrom 1990, 2009, Tucker 2010). Yet, clear boundaries would not be enough if users' rights are not supported by the capability to claim and defend them against outsiders or more powerful actors (Mayers and Vermeulen 2002). In a concession contract, the state shares responsibilities with the concessionaires through mechanisms backing up its exclusion rights (Monterroso and Barry 2012).

Forest users' characteristics are an essential component to analyse since they are leading to specific outcomes of forest governance (Agrawal 2001, Ostrom 2009, Von Halle 2014). Among the several constraints to sustainable forest management the probably most important is that the sustainable management of natural tropical forests is less profitable than other ways of using the land such as agriculture and ranching or mining (Balbinotto 2012, ITTO 2013). Therefore the costs of maintaining the forest resources should be offset by the importance of the resource for the forest users' livelihood and by the high value this one attributes to the resource (Agrawal 2001, ITTO 2013, Ostrom 2009). In addition to this, several scholars on forest governance have highlighted the importance of cohesion between forest users to strengthen their rights and voices (Agrawal 2001, Marshal et al. 2006, Ros-Tonen et al. 2008). Leadership and cooperatives from concessionaires can improve their participation in decision-making processes (Agrawal 2001, Ostrom 2009) and in that way increase the probability for the institutions to fit with local needs (Mayers and Vermeulen 2002, Ros-Tonen and Kusters 2011, Tucker 2010).

Regarding the third component, several studies have already demonstrated that any effort to examine institutional framework related to the allocation and use of NTFPs, must be complemented with the analysis of the condition for the access to markets, as both affect how NTFPs are managed (Ndeinoma and Wiersum 2017, Wiersum et al. 2014, Wiersum and Endalamaw 2013). Small scale producers often face restrictions and limitations to enter in the market (Mayers and Vermeulen 2012). An aspect that may increase their vulnerability against large buyers (Mayers and Vermeulen 2012, Ros-Tonen and Kusters 2011). Taking a chain perspective allows to understand if the conditions imposed by the buyers affect the sustainability of forest products management (Ingram 2014, Wiersum et al. 2014) and therefore the outcomes of the Brazil nut concessions system. Absence of burden to market entry for small

scale producers is a first effective mean to avoid them to be involved in manipulative or inequitable deals (Mayers and Vermeulen 2012)

These aspects related to the institutional arrangement, Brazil nut concessionaires and Forest products chains will serve as a basis for the evaluation of the Brazil nut concession system.

## Methodology

Within the three essential categories of the Brazil nut concession system, a set of governance enabling conditions for the sustainable use of forest resources and respective indicators have been defined (table 3). The indicators indicate if the conditions are met or no. These conditions have been selected through a combination of literature review on successful forest governance, on most common problems associated with forest concessions worldwide and literature on trends associated with NTFP management. If these conditions are not met it implies the presence of issues within the Brazil nut concession system that undermine the sustainable use and conservation of Brazil nut forest resources. Based on the indicators from table 3, different sources of information have been used to assess if the enabling conditions are met or no.

- 1) Semi-structured interviews conducted from May to July 2017 with 50 Brazil nut concessionaires from Tahuamanu and Tambopata provinces, where are situated most of Brazil nut concessions. As regulations and authorities differ inside and outside National reserve, 11 concessionaires were selected from the Tambopata National Reserve (12,9% of total population), 18 from permanent production forests in Tambopata province and 21 from permanent production forests in Tahuamanu province (3.5% of total population) (Figure 1). As there was no government list with contact information on concessionaires and their unwillingness to be interviewed at the time of the interviews, snowballing was used to select them. To avoid any bias and have a representative sample of the diversity of situations faced by concessionaires, the concessions of the interviewees are situated in different sectors (Figure 1). As the proximity of the Interoceanic highway may have an influence on the concessions in permanent production forests, there is an equative share of concessions close to the highway (18) and isolated in forest (21). The interviews provided information for all indicators by addressing concessionaires' experiences with Brazil nut concession norms, tenure security, relationship with state agencies, concessionaires' associations, relationship with different nodes from the Brazil nut and timber chain. Due to differences in regulations and authorities between both types of production forests, two different questionnaires were used for the two groups. Both questionnaires addressed the same themes but with different questions when it was relevant. The percentage of respondents facing similar situations provides qualitative data for the indicators. Among the concessionaires, five presidents and one ex-presidents of concessionaires' associations have been interviewed on the benefits and limitations of the associations.

To understand the context leading to the results from the interviews with concessionaires, 16 interviews have been conducted with experts among which two officials from national forest authorities, three officials from the DRFFS of Puerto Maldonado and Iberia, a grouping interview with three officials from the decentralized office of OSINFOR in Puerto Maldonado, one official from the decentralized office of SERNANP in Puerto

Maldonado, four officials from NGOs working with Brazil nut concessionaires, two represents of Brazil nut companies, two officials and one ex-official from a private funding organization working with Brazil nut concessionaires.

- 2) Official data from OSINFOR on the supervision of Brazil nut concessions and on the meetings organized with Brazil nut concessionaires to assess the indicators on the quality of law enforcement. The data provide information on the frequency of monitoring, the common infractions committed in the concessions and their recurrence, the understanding of concessionaires on the regulations.
- 3) Unpublished annual reports from the Regional Directorates and SERNANP on Brazil nut concessions. They contain information on the claims made by concessionaires to the authorities which provide data for the indicators on institution that fit the local context and the rights security. Data on annual production of Brazil nuts in the reserve and solicitude of timber permits to the DRFFS provide information for the indicators on importance of the resources.

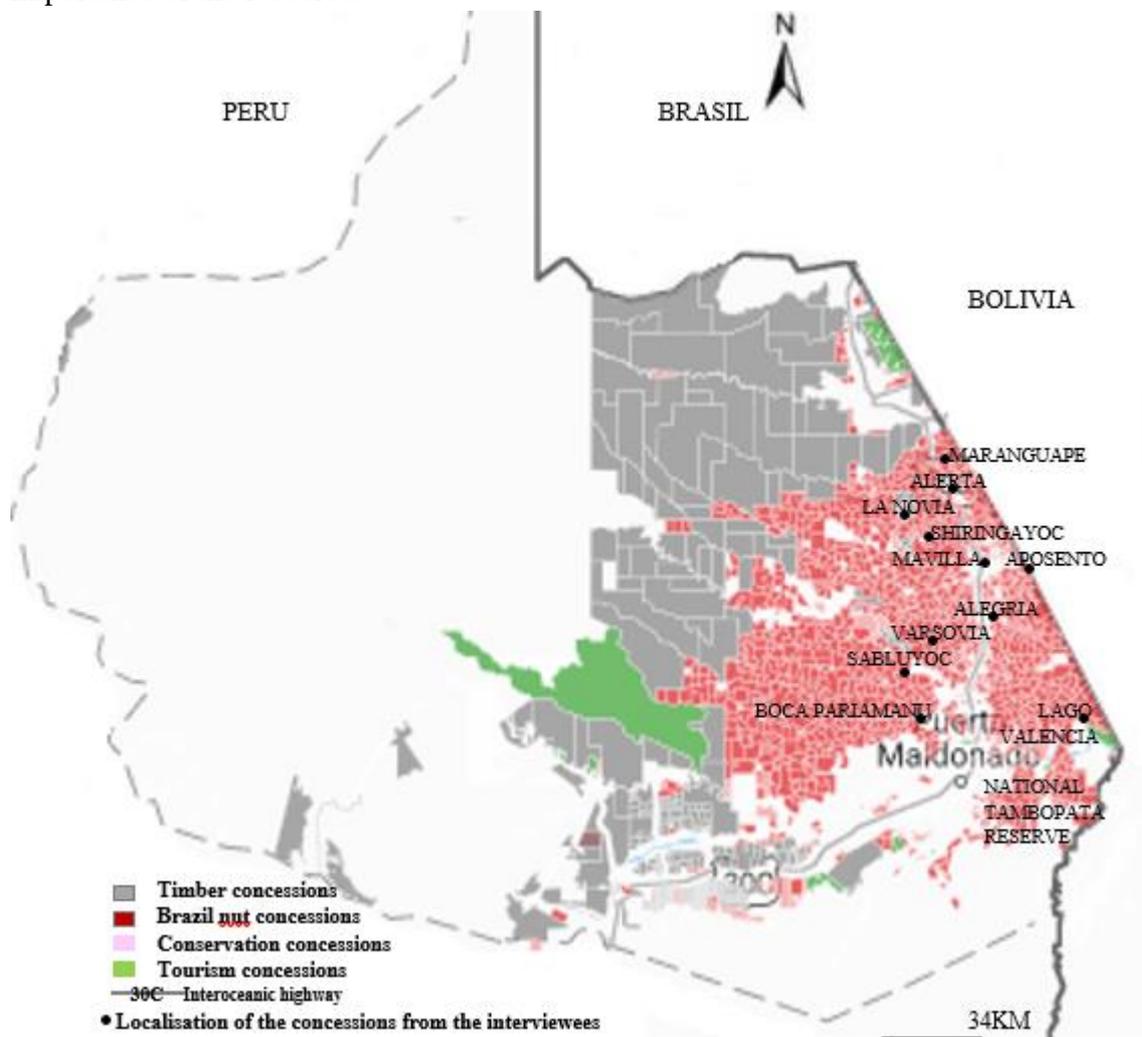


Figure 2: Map on the distribution of the concessions of Brazil nut concessionaires interviewed

Table 3: Governance conditions enabling the Brazil nut concession system to promote the sustainable use of forest resources and respective indicators

Essential categories	Governance enabling conditions	Indicators	Sources
Institutional arrangements	Institutions that fit the local context	Absence of regulatory burden for concessionaires	Agrawal 2007, Mayers and Vermeulen 2002, Ros-Tonen and Kusters 2011, Tucker 2010
		Inclusion of Brazil nut concessionaires in decision-making process	Agrawal et al. 2008, Mayers and Vermeulen 2002, Ros-Tonen and Kusters 2011, Tucker 2010
	Quality of law enforcement	Regular monitoring	Gibson et al. 2005, Gray 2002, Tucker 2010
		Effectiveness of measures and tools to prevent forest crimes	Azavedo-Ramos et al. 2015, Ferraz and Seroa da Motta 1998, Kishor and Rosenbaum 2012
	Rights must be secured	Existence and effectiveness of mechanisms for resolving disputes and conflicts over tenure and rights	Agrawal et al. 2008, Mayers and Vermeulen 2002, Kishor and Rosenbaum 2012, Van Halle 2014
		Clearly defined boundaries	Gray 2002, Mayers and Vermeulen 2002, Tucker 2010
USERS (Brazil nut concessionaires)	Importance of the resource is worth the effort to manage it sustainably	Concessionaires are dependent on the resources for a substantial portion of their livelihoods	Agrawal 2001, ITTO 2013, Ostrom 2009
		Concessionaires attach high value to Brazil nuts	Agrawal 2001, ITTO 2013, Ostrom 2009
	Appropriate leadership	Participation and benefits from concessionaires' associations	Agrawal 2001, Marshal et al. 2006, Mayers and Vermeulen 2002, Ostrom 2009, Ros-Tonen and Kusters 2011
Forest products chain	Market opportunities enable Brazil nut concessionaires to benefit sustainably from forest resources	Absence of barriers to market entry	Marshal et al. 2006, Mayers and Vermeulen 2002, Ros-Tonen and Kusters 2011, Ortiz von Halle 2014

## Results

### 1) Institutional arrangements

#### Institutions that fit the local context

Institutions that fit the local context accommodate local forest users' needs and are adapted to their capacities (Tucker 2010). It is a condition for Brazil nut concessions to promote the sustainable use of forest, considering that excessive and inconsistent forest regulations would create regulatory burden that restrict concessionaires to benefit sustainably from the forest (Mayers and Vermeulen 2002, Ros-Tonen and Kusters 2011). If Brazil nut concessionaires are included in decision-making over use and management of forest resources, the institutions would more likely to fit the local context and be seen as legitimate (Mayers and Vermeulen 2002, Ostrom 1990, Ros-Tonen and Kusters 2011, Tucker 2010).

#### *Indicator: Absence of regulatory burden for concessionaires*

All the concessionaires interviewed outside the reserve rely on their advisor to fill the Brazil nut management declaration (DEMA). Eight of them (20%) identified this document as useful for planning their work, while the rest only identify it as an administrative obligation. Although the change of the POA for the DEMA should have simplified the administrative procedure for Brazil nut harvesting, all the interviewed concessionaires argued that in practice nothing has changed considering that the complexity of the document still makes them dependent on an advisor. This dependence on an advisor represents a cost, for the elaboration of the DEMA it is around 300-400soles/92-123US\$ according to the president of an association. In the National Tambopata reserve, the declaration before the harvest season and the annual report at end of the year are filled by all the interviewees themselves.

28 (72%) of the 39 concessionaires don't see the regulations shaping the concession as legitimate. The main protestations concern the too strict regulations for timber and the interdiction of agricultural land in the concession. This interdiction is seen as unjustified considering that it was requested as an indication of the concessionaires belonging to the concession during the granting process. Another explanation of this result is that concessionaires willing to harvest timber often struggle with the procedure to get the permit. Outside the reserve, 22 concessionaires (56%) argued they choose to not harvest timber because it is too expensive, complicated and time consuming. In general concessionaires see timber as a mean of subsistence that they harvest only when a financial need arises, but it can take months before receiving the approbation for the extraction. Such constraint besides the cost of the procedure are burden for the multi-uses of Brazil nut forest resources, and may incite the concessionaire willing to harvest timber to engage in informal forestry activities. Before the implementation of the system of regency from the law 29763, their lack of institutional capacity made most Brazil nut concessionaires dependent upon timber buyers for the development of the complementary management plan and the extraction (Cossío et al. 2014). According to interviewed agents from OSINFOR, the concessionaires have often firmed complementary plans for their concessions without understanding the content as they were elaborated by someone else. A situation leading to common problems of false information in the complementary plan. As an indication to this, the second most common infractions reported by

OSINFOR during control of Brazil nut concessions is the falsification of complementary plans to facilitate the extraction or transport of illegal timber harvested elsewhere. This results from a recurrent scenario where OSINFOR inspects the concession area and finds that the supposedly harvested trees mentioned in the complementary plan are still standing, indicating that the timber permit is used for timber harvested elsewhere. Another common problem is unauthorized timber extraction or extraction outside authorized zone which has been reported by OSINFOR in 78% of the cases of sanctions between 2009 and 2016. The main reason for this is that the timber buyer who is in general also the one doing the harvesting in the concession, is only dedicated to the extraction and has little preoccupation for the rest of the stand (Cossío et al. 2011). Among the 14 interviewed concessionaires that have received fines, 10 (71%) declared they were sanctioned for infractions done by timber harvesters they contracted. The lack of concessionaires' capacity to deal with timber regulations is therefore leading to unsustainable extraction and consequent financial loss.

The infractions related to timber in the Brazil nut concessions may be reduced now that an official regent shares the responsibilities for the elaboration of the intermediary plan and the extraction. However, this change of legislation also represents a new cost that not all concessionaires are willing to pay. A pattern represented by the decrease of timber permits solicited to the DRFFS for the Tambopata-Manu province: 300 permits for timber extraction in Brazil nut concessions have been solicited in 2014, 97 in 2015 and 99 in 2016 (DRFFS 2016).

*Indicator: Inclusion of Brazil nut concessionaires in decision-making process*

In permanent production forests, the majority of the interviewed concessionaires have participated in reunions organized by OSINFOR but not by the DRFFS. In relation to this, the state authority is mainly associated to OSINFOR and 38% of the concessionaires argued that the state only acts as a controller and not as an informer. Between November 2013 and January 2014, six workshops were organized with concessionaires by NGOs in collaboration with the US forest service to collect their recommendations for the draft of the Regulations of the Law No. 29763 (Poquioma et al. 2014). Among the recommendations, the concessionaires requested management documents more straightforward for Brazil nut harvesting to replace the POA (Poquioma et al. 2014). However, the previous results on the dependence of concessionaires to an advisor demonstrate that these recommendations were not taken sufficiently into consideration for the design of the DEMA that is still a too complex document for Brazil nut harvesting.

The Brazil nut concessionaires from the reserve mentioned they are invited annually to a meeting with the SERNANP before the harvest season informing on the regulations. Besides of this, the concessionaires participate in the actualization of the master plan every five years through meetings. According to the interviews, the SERNANP is rather perceived as an ally than strict controller. The main concern that concessionaires mentioned in the meeting for the elaboration of the next master plan was related to invasions by indigenous communities in the concession. In response to this, the interviewed official from SERNANP argued that concessionaires will be authorized to enter early in their concession by moving forward the harvest season.

Quality of law enforcement

It has already been demonstrated that law enforcement through regular monitoring better ensures the maintenance of forest than sporadic monitoring (Tucker 2010, Gray 2002). To be effective, law enforcement strategies should tackle the roots of illegal forest activities through a variety of measures for their prevention, detection and suppression (Azavedo-Ramos et al. 2015, Ferraz and Seroa da Motta 1998, Kishor and Rosenbaum 2012, Ostrom 1990).

*Indicator: Regular monitoring*

Between 2009 and 2016, OSINFOR carried out 634 inspections on the compliance of Brazil nut concessionaires with Brazil nut and timber management plans and concession contracts. This implies that almost half of the concessionaires have never been controlled since they have their concession. Figure 2 illustrates the distribution of supervisions of Brazil nut concessions since OSINFOR is an independent organisation. It shows that less than one-tenth of Brazil nut concessionaire is controlled each year. Because the concessions are not regularly monitored, the command and control approach doesn't guarantee that forest management in the concessions is free of illegal activities.

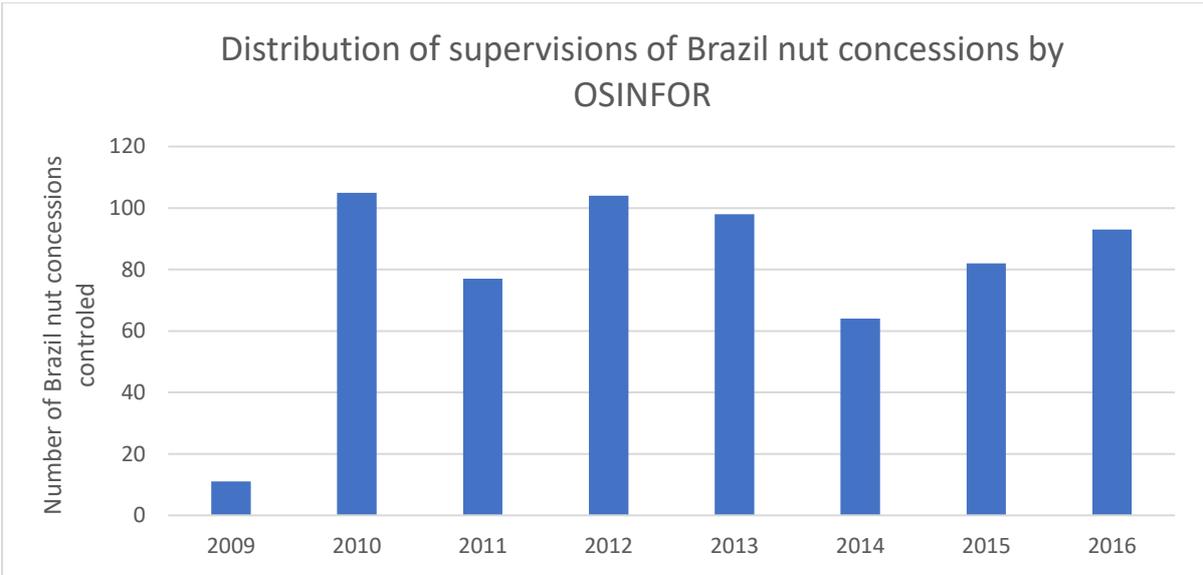


Figure 3: Distribution of supervisions of Brazil nut concessions by OSINFOR between 2009-2016. Source: data from OSINFOR, August 2017

*Indicator: Effectiveness of measures and tools to prevent, detect and suppress forest crimes*

As it has been explained before, the falsification of timber management plans established to ensure sustainable logging enables the illegal logging activities occurring in unauthorized areas. Therefore, to detect forest crimes OSINFOR controls in priority the Brazil nut concessionaires using timber management plan. The representatives of OSINFOR argue that most of concessionaires harvesting timber are doing infractions by failing to comply with the timber management plan. A strategy that indeed allows OSINFOR to detect illegal activities in the

Brazil nut concessions considering that among the 634 supervisions carried out, 373 (59%) resulted in sanction, 202 (32%) have been archived and 59 are still in process (9%). Figure 3 shows that most illegal activities concern timber extraction and not Brazil nut harvesting. Although the strategy from OSINFOR to select the concessionaires allow them to detect illegal timber in the Brazil nut concessions, it seldom targets the principal violators who are mainly the timber buyer and extractor. The law enforcement on timber extraction in Brazil nut concessions is restricted to the concessionaire and doesn't cover actors from the timber chain involved in the business practices. Another limitation of the effectiveness of this strategy is that OSINFOR mainly checks the concessionaires with the regulatory documents to harvest timber, missing the illegal logging activities that may occur in concessions without timber permit. During an interview with the director of OSINFOR office from Puerto Maldonado, he admitted that illegal logging may be more important in concessions without permit than the ones with the legal documents.

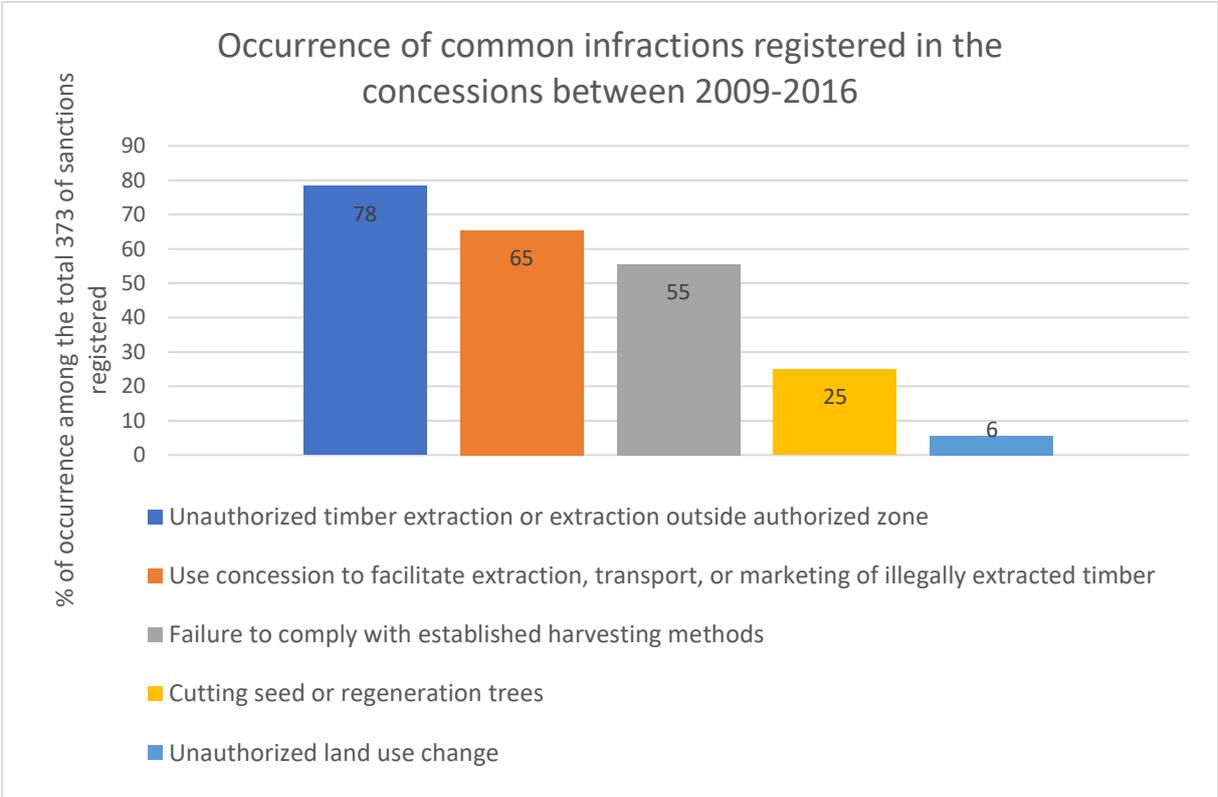


Figure 4: Occurrence of most cited infractions registered by OSINFOR in Brazil nut concessions between 2009 and 2016. Source: data from OSINFOR, August 2017

The principal mechanism used by OSINFOR for the suppression of forest crimes is the application of fines. The cost associated to the fines for the different infractions are high and concessionaires often cannot pay it. As an indication of this, the two most common infractions of Brazil nut concessionaires cited before are considered as really severe infractions for which the corresponding fines vary between 40 500 and 20 250 000 soles (12 480 - 6 251 014 US\$)<sup>7</sup>. Five concessionaires argued that they cannot pay the fines they received because they are too high. This illustrates that a unique system of punishment for all type of forest concessions is inadequate. A fine easily paid by a large timber company is an enormous punishment for a Brazil nut harvester. Too strict sanctions are not necessary an effective mechanism for law enforcement. Indeed, among the 75 concessions controlled more than once, 25 (33%) have been sanctioned for both controls. A number that is underestimated considering that 24 second controls are still in process to be evaluated as sanctions or archived. In addition to this, 59% of Brazil nut harvesters don't consider as legitimate the mechanisms used by government to enforce good forestry practices, complaining it only imposes controls methods and no economic incentive instruments for sustainable management.

To prevent forest crimes OSINFOR organizes workshops of information about the forest uses regulations. In Madre de Dios OSINFOR did not organize workshops before 2012, and 39 have been organized between 2012 and 2016 for all actors from the forest sector. In July 2017, OSINFOR made a survey during a workshop organized for the Brazil nut concessionaires, on the knowledge that concessionaires have on the regulatory framework and their perception on OSINFOR work. Results from this survey filled by 52 respondents (including 49 Brazil nut concessionaires) are represented in table 4. The results from this table indicate non-only the lack of knowledge from concessionaires on the regulatory framework, but also that actions from OSINFOR are seen as illegitimate by the majority of them.

Table 4: Results of OSINFOR survey on Brazil nut concessionaires knowledge on the regulatory framework.

Questions asked	Answering “yes”	Answering “more or less”	Answering “no”
Do you know the forestry infractions and their consequences?	25%	30.8%	44.2%
Do you know who is OSINFOR?	48.1%	28.8%	23.1%
Do you know the function of OSINFOR?	32.7%	38.5%	28.8%
Do you agree with OSINFOR work?	15.4%	40.4%	44.2%

According to an official from SERNANP, none of the concessionaires from the National Tambopata reserve has been sanctioned for illegal activities. Two concessionaires from the reserve argued that the system of control of SERNANP is not sufficiently strict and it should better control the hunting of wildlife in the concessions, while the rest of the interviewed consider the system of control of SERNANP as accurate.

## Security of forest rights

Security of forest users' rights is widely recognized as a necessary condition for the forest governance to ensure the sustainable use of forest (Gray 2002, Mayers and Vermeulen 2002, Tucker 2010). As explained in before, secure forest users' rights involve clearly defined boundaries (Mayers and Vermeulen 2002, Ostrom 1990, 2009, Tucker 2010) and the existence of effective mechanisms to claim and defend users' rights against outsiders or more powerful actors (Mayers and Vermeulen 2002).

### *Indicator: clearly defined boundaries*

The main benefit associated with the implementation of the concession and mentioned by the concessionaires is the acquisition of exclusive rights on the resources.

Yet, twenty (51%) out of the 39 concessionaires from permanent production forests mentioned having problems of superposition with the adjacent concession. Among them 7 argued that because of this they cannot physically delimit their concessions although it is an obligation. Problems of superposition result from the lack of means for the delimitation of the concessions during the concession granting process. According to the concessionaires the limits registered in their contract often differ from the area they were used to work before. They first did not perceive it as a problem as anyone kept managing the same Brazil nut trees than before the reform. The problem appeared with the arrival of new concessionaires or their children that refer to the official limits from the contract and do not know the old customary ones. In the reserve, one of the interviewee has problems of superposition with the adjacent concession. A lower percentage resulting from the complete resizing of all the concessions with the support of NGOs.

In addition to this, the lack of cross-sectoral coordination, especially between the forest, agricultural and mining sector has often been mentioned in the interviews with the regional government agencies. This can be perceived in the degree of overlapping land uses between Brazil nut concession and other land uses. In a study on superposition between Brazil nut concessions and other land uses, Chávez et al. (2012) established that 113 556ha of concession are in superposition with private agriculture lands and 101 997ha with mining concessions. According to an agent of the DRFFS of Puerto Maldonado, the reason is a lack of sharing of standardised and digitalised information on land titular between sectors. Especially that the decentralised offices do not always contain the adequate equipment to have access to this information. It is worse to note that this problem partly results from the concession granting process during which open areas were included in the concession as a demonstration of the belonging of the Brazil nut harvester to the area. Although most of the time the concessionaire is the owner of the agricultural area superposed to its concession, there are cases where he is not. A situation that has been reported by one of the interviewee, leading to conflicts and insecure tenure.

### *Indicator: Existence and effectiveness of mechanisms for resolving disputes and conflicts over tenure and rights*

Claims related to overlapping land required the concessionaires to find a common compromise and assume the associated costs for the resizing. As a result, this problem may last for years

unless the government intervenes. Yet, officials from the DRFFS consider that it is a problem proper to the concessionaires and it should be solved by themselves.

In permanent production forests, two concessionaires complained about agricultural invasion by farmers in their concession, and 22 (56%) mentioned they had experienced problems of invaders robbing timber or Brazil nuts in their concession. This is especially a problem for the concessions close to the interoceanic highway with an easy access. During an interview, a concessionaire mentioned that he is currently harvesting timber otherwise others will come to steal it from his concession. In order to not be held responsible for the damage done to the forest, the concessionaires have the responsibility to denunciate it to the regional authority. However they all complained about this process that is seen as expensive and is never leading to any impact as the officials lack the logistic capacity to intervene. There are six officials working in the Brazil nut sector in the office of Puerto Maldonado, and three in the office of Iberia to supervise more than a thousand of concessionaires. The absence of working insurance and the low salary offered to technicians restrict the recruitment of trained and highly-motivated staff. As expressed by an official from one of the regional agencies (2017):

“No honest and free-antecedent person wants to work here with that kind of conditions”. (personal communication with an official from DRFFS, July 2017).

A confidence that also raises concerns about the motivation to work for the low-paid staffs. Therefore, even if it is stated in the concession contract that the state has to intervene in case of invasion, on the field it is rather a responsibility assumed by the concessionaire alone. In 2015 and 2016 the regional government received for the forest sector respectively 296 and 238 denunciations of infractions among which they could deal with only 116 and 141 due to insufficient resource (DRFFS 2015, 2016). Concessionaires feel that they are undertaking all the responsibilities toward their concessions while the state is not complying with its role. As a result, the authority from the state is not seen as legitimate for most concessionaires who argued that officials only review compliance with regulation from Brazil nut harvesters but do nothing to remove illegal invaders in the concessions.

In the National Tambopata reserve, 10 (91%) of the interviewed concessionaires complained about problems with indigenous communities living in the reserve and invading the Brazil nut concessions. The interviewees argued that members of the communities enter in the concession before the harvest season to extract timber, Brazil nut or steal material from the campsite. According to one official of SERNANP they are missing guards in the zone with concessions because more urgent intervention is needed in the part threaten by mining expansion. As mentioned before, concessionaires will be authorized to enter early in their concession by moving forward the harvest season.

## 2) Brazil nut concessionaires

Importance of the resource is worth the effort to manage it sustainably

A well-known argument for forest sustainability is that the importance of the resource for the forest users' livelihood and the high value this one attributes to the resource are incentives for the maintenance of forest in good conditions (Agrawal 2001, ITTO 2013, Ostrom 2009).

*Indicator: Concessionaires are dependent on the resources for a substantial portion of their livelihoods*

Benefits from the concession vary widely between concessionaires as it depends among other on the concession size and ease access. Yet, the instable production (figure 4) and market flow made the financial benefits received from the harvest season insufficient for a living for all year. Benefits may even be particularly low during years of poor production as the one of 2017 during which concessionaires argued they collected less than half of Brazil nuts they are used to, and two reported they didn't get any sack of Brazil nut.

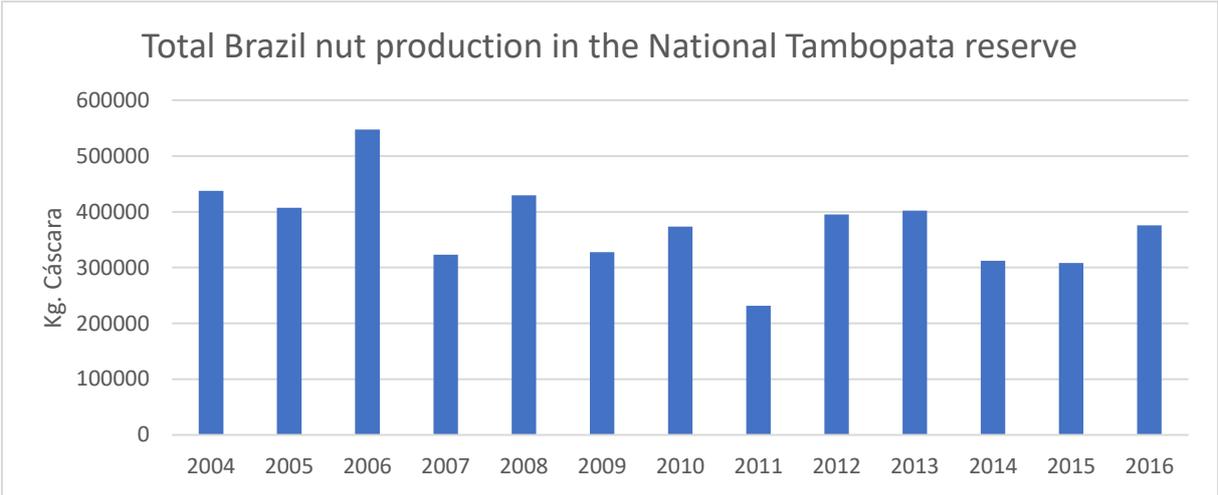


Figure 5: Annual extraction of Brazil nuts in the concessions of the National Tambopata reserve, registered at the control posts. Source: data from SERNANP, August 2017.

Concessionaires from the reserve or with a concession in remote areas have additional activities in the city such as shops or taxi services, or work in agricultural land. For the concessionaires close to the highway, moving back to the city of Puerto Maldonado represents a risk of invasions by outsiders. Nunes et al 2012 estimated that Brazil nut production can compete economically with small landholder agriculture if it is associated with ecotourism and sustainable logging. However only ten (26%) out of the 39 interviewed concessionaires are harvesting timber, and 11 out of the 18 (60%) concessionaires interviewed close to the highway mentioned they don't benefit from additional income from their concession. As it was explained before, the severe sanctions received added to the increased cost of the regency lead to a decreasing interest to extract timber. Therefore, these concessionaires close to the highway have additional work not related to forest in the village, agricultural land or may move back to the city of Puerto taking the risk to be invaded. During the interviews, it was reported that some concessionaires are renting part of their concession to farmers for additional revenue. To avoid the cancelation of their concession they may afterward denunciate the farmer as an invader, knowing that it can take years before the intervention of the state authorities. In order to increase the presence of the concessionaire in the concession by increasing its financial value, NGOs are implementing projects of Agroforestry in the concessions close to the highway.

*Indicator: Concessionaires attach high value to Brazil nuts*

For the concessionaires harvesting Brazil nut for years, this activity is often seen as a passion. However the interviews revealed that the lack of integrated forest management in the

concession results in a decrease of interest from concessionaires' children in the Brazil nut activity. When the concessionaires were asked about the interest of their children in the concession, 11 (28%) declared that their children are not interested, and 16 (41%) declared they have at least a son or daughter interested. The rest of 31% have children too young to be interested or not. Among the 28% that don't have children interested in the concession, five declared they will sell it to a third party. For the descendants of Brazil nut concessionaires, a full-time work in the city is seen as more attractive than the periodic income from Brazil nut harvesting. In a personal communication with a son of Brazil concessionaire he mentioned that harvesting Brazil nut has a pejorative connotation for young people, seeing it as the activity of the poor. In the permanent production zone, this lack of interest sometimes makes the children sell the concession. In relation to this, cases of land use change within a concession have been observed after it was sold (Alerta ambiental castaña 2017). To avoid this new threat, it is therefore crucial to revive the interests of young professional for the Brazil nut concessions. This is an urgent issue to address considering the relatively advance age of current Brazil nut concessionaires. Data from the DRFFS show that among the 1123 concessionaires registered in 2017, 35% has between 22 and 50 years old, 35% between 51 and 70 years old, and 10% between 71 and 92 years old (20% unknown).

#### Leadership from Brazil nut concessionaires

As it was explained before, the institutions are more likely to fit the local context when forest-dependents are included in the decision-making processes (Mayers and Vermeulen 2002, Ros-Tonen and Kusters 2011, Tucker 2010). Leadership from Brazil nut concessionaires is an indication on their ability to strengthen their voices and be included in such processes (Agrawal 2001, Ostrom 2009). It has also an influence on the results from the previous section as cooperatives between producers can increase their participation in global markets and get higher benefit from forest products (Mayers and Vermeulen 2002, Ros-Tonen and Kusters 2011).

#### *Indicator: Participation and benefits from associations of concessionaires*

Among the 50 interviewees, 29 (58%) belong to an association and 10 (26%) declared they don't belong to an association because they distrust their efficacy. This is due to bad financial management of the association or negative influence from elites that exploited the association for financial or political advantages. Among the concessionaires belonging to an association, 7 declared they don't get any advantages from the association, and 19 (44%) affirmed that the association gives them financial advantage. 10 of them belongs to the association RONAP and 9 to the association of the reserve ASCART. The main reason is that these two associations are selling the Brazil nuts from their members which give them more importance for the price negotiation with companies. ASCART is the more developed association, with 45 members it is the only one with a working processing plant that increases the value of the product. Its agreement with the Agrobank also gives the possibility to its members to get access to advantageous credits for the harvest season. The weak social capital of concessionaires was mentioned as a limitation for the interviewed presidents of associations and agents from NGOs willing to cooperate with concessionaires.

### 3) Forest products chains

#### Enabling Market opportunities for Brazil nut concessionaires

Brazil nut concessionaires are included in the Brazil nut and timber chains. This means that they are confronted to buyers' conditions which can affect the management of forest (Ingram 2014, Wiersum et al. 2014). Absence of burden to market entry for small scale producers is a first effective mean to avoid them to be involved in manipulative or inequitable deals (Mayers and Vermeulen 2012). Certification for Brazil nut may be an opportunity for their members to overcome the barriers to entry in the market (Quaedvlieg et al. 2014).

#### *Indicator: Absence of barriers to market entry*

As the majority of Brazil nut concessionaires have no access to microcredit, to finance the harvest season they rely on informal funders among which Brazil nut companies play an important role. 58% of the concessionaires interviewed get an advance payment by a firm that they later reimburse with their production. The ones belonging to the association ASCART have access to credits through the association. The firms are also more disposed to provide loans when they have a long-term contract and trust relationship with the producer. A situation that may reduce the liberty of the concessionaire to change of buyer every year and choose the highest bidder. Because of the decrease of availability in the local market of Brazil nuts after the harvest season, its value is often higher in May than January or February. However, the advance payment from the firm makes the concessionaire sell sooner its production and get less benefit from this fluctuation. As a result, this financial dependence creates a vertical interaction between the buyer and producer, leaving the concessionaire with little price negotiation power and lower financial benefit from the concession.

The benefits from certification reported by the interviewees and confirmed by previous studies (Quaedvlieg et al. 2014) were mainly associated to the trainings received on production and management skills rather than economic benefits. According to a representative of a certificate company, concessionaires are less willing to adopt certification scheme because it is stricter while the no-certificate companies give similar price for Brazil nut without such exigency.

As it has been mentioned before, Brazil nut harvesters willing to participate in the timber market are restrained by an administrative procedure that makes them dependent upon the buyers to carry out the extraction and transaction work. This unequal and informal relationship non-only minimizes concessionaire profit from this activity, but also often results in unsustainable timber management in the concession.

## Discussion

With the concession reform, the policy context framing the Brazil nut activity took a new course at the beginning of the 2000s. For Brazil nut harvesters it was an important step in obtaining exclusive resource rights. However, the results revealed that the Brazil nut concession system is associated with issues related to the institutional arrangement, the Brazil nut concessionaires and the forest products chain that compromise the sustainable use of Brazil nut forest resources.

These issues result from the absence of the governance conditions enabling the sustainable use of Brazil nut forest resources. This is discussed in more detail below.

## Issues and absence of the enabling conditions proper to the institutional arrangement

### Institutions that don't fit with the local context

The difference of institutional capacity between the concessionaires in the National Tambopata reserve and in permanent production forests indicates that Brazil nut regulations outside the reserve are not adapted to concessionaires' realities. The cost for the Brazil nut management declaration is unjustified as it is not leading to better harvesting by concessionaires (Peña 2010, Perales and Guariguata 2015, Poquioma et al. 2014). Especially that the simplest administrative procedure in the reserve works well for concessionaires while the Brazil nut extracting activities is similar than elsewhere. As the cost for the elaboration of the DEMA appears before the harvest season it further increases the importance of loan for concessionaires and decreases their financial benefit. An issue that indirectly affects the outcomes of the Brazil nut concession system as for concessionaires close to the highway, insufficient financial benefits from the concessions has been associated to threats of deforestation.

In addition to this, the complexity of timber regulations is a burden for the concessionaires in permanent production forests to benefit from this complementary source of income. A burden leading to important issues as the incapacity of concessionaire to deal with timber management plans and dependence on intermediaries have resulted in several cases of sanctions and unsustainable extraction. The main concern with Brazil nut concessions are not related to Brazil nut harvesting, but rather timber extraction. Results on the recurrence of false complementary plans indicate that it is the documents established to ensure sustainable logging that are used to enable the illegal logging activities occurring in unauthorized areas. This scenario has also been reported in logging concessions, creating a logging crisis in Peru (Finer et al. 2014). Brazil nut concessions are not a unique example of governance arrangements facing difficulties to implement an integrate forest management, similar trends were also associated to Brazil nut harvesters in Bolivia (Cronkleton et al. 2012). In their study on compatibility of timber and NTFP management, Guariguata et al. (2010) mentioned that conflicting institutional approaches, norms and regulation often limit multiple forest use across the tropics. However, the experience from Guatemala's Maya Biosphere Reserve has demonstrated that multiple-use forest management within concessions held by smallholders can work under some conditions (Radachowsky et al. 2012). Among these, devolution of authority and local rights, as well as technical and institutional capacity of forest users are key conditions that still need to be improved for the Brazil nut concession model to work. Trainings should focus on the next generation of Brazil nut harvesters in a way to revive their interest in the concession.

This finding on inadequate regulations is not unique and conforms with the tendency towards overwhelming bureaucracy for small-scale producers and NTFP regulations through the world (Brown et al. 2003, Laird et al. 2016, Ros-Tonen and Kusters 2011, Tieguhong et al. 2015). In Peru as other cases of smallholder management, the policies have been implanting without taking into account the lack of knowledge, technical and economic capacities of small forest users (Cossío et al. 2014, Laird et al. 2010). Especially that this makes them more prone to be involved in manipulative or inequitable deals (Cossío et al. 2014). A common reason for this

administrative burden is the marginal importance given to small forest users voices in decisions over use and management of forest resources (Laird et al. 2010, Mayers and Vermeulen 2002, Pacheco et al. 2016). In Peru this is represented by the failed of the last forestry law and regulations to fully address the requests made by Brazil nut concessionaires. As it was expressed by concessionaires from permanent production forests, their requests were not considered for the creation of the DEMA as it does little to improve the concessionaire institutional capacity. The only notable improvement is that compared to the previous POA, the DEMA can be elaborated for 5 years instead of annually. The participatory process between concessionaires from the reserve and the SERNANP seems to address local needs as it is indicated by the measure taken by the authority moving forward the authorization to enter in the concession.

#### Poor law enforcement

To create incentives for sustainable forest management, government could use two types of mechanisms: command and control methods, or economic instruments (Balbinotto et al. 2012, Ferraz and Motta 2009, Pacheco et al. 2016). When the cost of monitoring all concessions is too high, as it is the case in Peru, market-based incentives may be a more efficient mechanism (Søreide 2007). Despite this, Peru favoured the command and control approach and did not promote economic instruments for the Brazil nut concessions. A method that has already been proved as insufficient to eliminate illegality in other countries (Pacheco et al. 2016). This holds true for Brazil nut concessions as it has been indicated by the recurrence of infractions. Moreover the mechanisms used for law enforcement seldom targets the main violators who are actors from the timber chain. Results from the survey of OSINFOR indicate that the lack of legitimacy of government sanctions and regulations further reduce the legitimacy of the forest agency. An issue often associated as a limitation for the influence of the authority to ensure law implementation by forest users (Monterroso and Barry 2012). Difficulties for law enforcement in Peru correspond to experiences of countries around the world that have problems in monitoring and regulating concessions (Amacher et al. 2012, FAO 2001, Ferraz and Motta 2009).

#### Poor tenure security

The allocation of Brazil nut concessions promoted social equity among concessionaires by not excluding small-scale producers but respecting their claim rights to traditional lands. Yet, the massive granting of Brazil nut concessions in a record time led to unclear delimitation of territories that have current repercussions on tenure security. The concession granting process has created new problems of superposition between concessionaires who consider the delimitations written in their contract as another layer of formal property rights added to their customary rights. Superposition of boundaries creates uncertainty on the productive potential of the concessions and anger for concessionaires that feel like their resources are robbed. When timber extraction is involved in the superposed area, it can negatively affect the outcomes of the Brazil nut concession system if the impacts of the extraction from one concessionaire counteract the efforts made by the other one to conserve the resource.

Another important factor that doesn't promote the sustainable use of forest in the Brazil nut concession is the inability from the Government of Madre de Dios to ensure the security of

concessionaire rights against invaders. In any concession contract, the process of authorising rights is linked to the legitimacy of the rights-granter and rights receiver (Monterroso and Barry 2012). Both sides play key roles in maintaining the security of those rights (Monterroso and Barry 2012). However, the low response of the DRFFS to concessionaires denunciations and the lack of officials attributed to the Brazil nut sector indicate that the forestry authority lacks the resources to enforce the rules of concession contracts and undertake its responsibilities. The important rate of invasion and associated forest damage confirm that a concession contract doesn't provide strong tenure security when only one side takes its responsibilities. Lack of government protection creates disincentives for forest users and may lead to the open-access of forest zones (Tucker 2010). This holds true for Brazil nut concessionaires. The results revealed that in some cases concessionaires take profit of the lack of intervention from the state and rent part of their concessions to invaders that they later denunciate. The lack of intervention from the government to protect concessionaires' rights confirms the usual little political will to allocate resources to politically and economically marginalized groups producing "minor" products (Laird et al. 2010, Wynberg and Laird 2007).

### Issues and absence of the enabling conditions proper to the Brazil nut concessionaires

#### Inability of the concessions to generate adequate living conditions for the concessionaires close to the highway

Although Brazil nut concessions were designed for Brazil nut as the primary use, the seasonality and instability of the production demonstrate that it is not a reliable strategy to provide an income for all year. This supports previous works on NTFPs economic benefits that should not be overestimated considering their intrinsic characteristics (Arnold and Ruiz Pérez 2001, Ros-Tonen and Kuster 2011). To make the Brazil nut concession fully profitable, rather than being an afterthought, government should have included harvesting of timber as an integrated Brazil nut and timber management adapted to the concessionaires' capacities (Guariguata and Rockwell 2015). The inability of the concessions to generate adequate living conditions for concessionaires is particularly an issue for the concessions with an easy access close to the highway. For these concessionaires, the move for additional income in town is associated with risks of invaders and hence unsustainable management of the forest resources. Low profit of the concession is also associated with less value attached by the concessionaire descendance which according to the interviews is more likely to sell the concession. This is an important issue if the concession is sold to a person with little concern for the Brazil nut forest resources. Therefore the inability of the concession model to enhance both forest and livelihood not-only undermines its legitimacy (Monterroso and Barry 2012), but also results in new threats of deforestation through a shift to agricultural land uses.

#### Low leadership of Brazil nut concessionaires

The results on the benefits concessionaires received from Brazil nut associations confirm the conclusion from previous studies on Brazil nut harvesters and their weak organizational capacity (Quaedvlieg et al. 2014). This affects the outcome of the concession system as the lack of associativity between concessionaires further increases their marginality in forest-related decision-making processes which was associated to inadequate forest regulations (Agrawal 2001, Guillaume 2017, Ros-Tonen et al. 2008). The individualism of concessionaires increases their vulnerability against more powerful actors from the timber and Brazil nut chain or against

invaders (Quaedvlieg et al. 2014, Ros-Tonen and Kusters 2011). The example of the association ASCART has demonstrated that a strong association can decrease the dependence of concessionaires on the Brazil nut firms and improve their financial benefit. Regarding timber extraction, strong associations between concessionaires can improve their access to the techniques and information on regulations (Sick 2008). Therefore, they can have an influence not-only on the concessionaire financial return from the concession, but also on the management of forest resources.

### Issues and absence of the enabling conditions proper to the forest products chain

#### Market conditions for Brazil nut concessionaires promote the sustainable use of the forest resources

Taking a chain perspective allows to understand the dependence of Brazil nut concessionaires to other actors involved in Brazil nut and timber chain, and its effect on the sustainability of forest products management (Ingram 2014). The results indicate that the lack of access to credits act as burden for concessionaires and make them dependent on Brazil nut firms. This creates a vertical relationship that reduces the financial return from the concession. An issue that indirectly affects the outcomes of the Brazil nut concession system as lower financial return is associated to the risks mentioned before on deforestation close to the highway. In addition to this, Brazil nut concessionaires willing to enter in timber chain are restrained by the timber management plan that makes them dependent to intermediaries and subject to the conditions they imposed. This inequitable and informal relationship has direct consequences for the outcomes of the Brazil nut concession system as it often leads to bad forest management and financial loss.

Quasi-hierarchical value chain is not uncommon in countries lacking technical capacity for engaging in upstream activities (Gereffi and Lee 2014, Ndeinoma and Wiersum 2017, Pacheco et al. 2016). In response to this, different strategies for smallholders' empowerment have emerged such as certification schemes, producers' association and partnerships between forest users and actors from other sectors (Quaedvlieg et al. 2014, Ros-Tonen et al. 2008, Ros-Tonen and Kusters 2011, Shanley et al. 2008). Experiences from Brazil have demonstrated that partnerships and certification schemes can work for NTFP and smallholder harvesters (Ros-Tonen et al. 2008). But in Peru a number of challenges still need to be overcome. Especially, the lack of collective action and cohesion between Brazil nut harvesters make these upgrading strategies less likely to work. Reinforce the associative initiatives is therefore a necessary step to improve the market conditions that are facing Brazil nut concessionaires.

### Conclusion

Although the creation of Brazil nut concessions was a significant attempt to include NTFP as a crucial component of a regional development strategy, the study shows that the Brazil nut concession system is associated with issues related to the institutional arrangement, the Brazil nut concessionaires and the forest products chains. These issues compromise the sustainable use of Brazil nut forest resources and run counter to the principles associated with successful forest governance (Tucker 2010).

First, in permanent production forests, institutions that don't fit with concessionaires capacities reduce their financial benefits from the concessions and create dependence on timber buyers that result in unsustainable timber extraction. This is further enforced by the lack of associativity between concessionaires that increases their marginality in forest-related decision-making processes and in their relations with actors from timber and Brazil nut chains. The interactions of these factors associated to the institutional arrangement, the Brazil nut concessionaires and the forest products chain don't allow concessionaires to benefit sustainably from forest resources. This is an issue for concessions in zones with risk of invasions where the absence of concessionaires after the harvest season is associated to threats of deforestation. Second, irregular monitoring and inefficient mechanisms for law enforcement are not able to tackle efficiently illegal logging occurring in the concessions. Third, low tenure security discourages sustainable forest management and counteracts concessionaire efforts to conserve the resource by invaders damaging the forest.

On the other hand, the example of the Brazil nut concessions in the National Tambopata reserve demonstrates that straightforward interventions resolving some of these issues are feasible in the region. First a simple administrative procedure for Brazil nut extraction can work and decreases the cost associated with the concessions. Second, a better inclusion of concessionaires in decision-making processes tends to better address their claims and make the state authority more legitimate. Third, it is possible to build a strong association between concessionaires in the region that decreases their dependence to actors in Brazil nut chains, increasing the financial benefit from the concession.

The findings are associated to common issues related to NTFP management and small-scale producers such as regulatory burden, vulnerability against more powerful actors, and lack of intervention from state agencies, and issues commons to concessions system worldwide such as poor law enforcement. For the Brazil nut concession system, this conclusion indicates that the same recommendations previously done on the institutional framework by various authors (Guariguata and Rockwell 2015, Pena 2010, Perales and Guariguata 2015, USAID 2014) and on the necessity to strengthen associativity in the region (Quadvlieg et al. 2014) are still relevant.

This study confirms that the strategy from the government to promote the sustainable management of forest through a concession contract is unlikely to work by only clarifying land tenure and establishing conditions that constrain the concessionaire to enforce SFM. The issues affecting the outcomes of the Brazil nut concession system demonstrate that any establishment of a concession model needs careful attention to the compatibility of the institution shaping the system with the characteristics of the forest users and the market conditions.

## Notes

- 1 Official data from Regional Directorate on Fauna and Flora Silvestre, 23 September 2017 and the National Natural Protected Areas Service, 31 August 2017
- 2 Official data from Regional Directorate on Fauna and Flora Silvestre, 23 September 2017
- 3 D. S. N° 014-2001-AG.- 06/04/2001 Aprueban el Reglamento de la Ley Forestal y de Fauna Silvestre. *Art. 40*
- 4 Official data from Regional Directorate on Fauna and Flora Silvestre, 23 September 2017
- 5 Official data from the National Natural Protected Areas Service, 31 August 2017
- 6 Management Plan of Bertholletia excels H.B.K in the National Tambopata reserve and National park Bahuaja Sonene 2008\_2012. Unpublished document
- 7 Reglamento de la ley forestal y de fauna silvestre N°29763, article 193

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## Annex 1: Questionnaire used with Brazil nut concessionaires

### Profile of the concessionaire

- a. Man/Woman
- b. Time working with Brazil nuts
- c. Sector of the concessions
- d. Access to the concession by boat or road

### Management

#### For concessionaires in permanent production zone

- a. Do you manage additional resources than Brazil nut in the concession?
- b. Do you see utilities in the POA and DEMA?
- c. Do you need help to fill the POA/DEMA (and timber management plan)?
- d. When do you receive the approbation of these plans?
- e. Do you know why the POA has been replaced by the DEMA?
- f. Do you reforest Brazil nut seeds?
- g. Do you have problems to manage the concession?

#### For concessionaires in the National Tambopata reserve

- a. Do you see utilities in the annual report?
- b. Do you need help to fill the declaration previous to the zafra and the annual report?
- c. When do you receive the approbation of these plans?
- d. Do you have problems to manage the concession?

### Legal framework

- a. Do you know why have been implemented concessions for Brazil nut?
- b. Were you informed on that change before it was applied?
- c. Do you participate in meetings or workshop on the regulations for the Brazil nut concessions?
- d. Do you agree with the regulations on Brazil nut concessions?
- e. Do you have difficulties to comply with a particular regulation?
- f. Have you already been sanctioned for non-compliance with a regulation?
- g. Which significant changes have you perceived with the implementation of the system of concession?

### Forest authorities

- a. With which forest agencies are you in contact?
- b. What is your relationship with it/them: control-information-support?
- c. Is the concession regularly monitored?
- d. Do you see the controls as legitimate?
- e. Do the forest agencies intervene when you do a denunciation?

## Tenure

- a. Is the concession regularly inventoried?
- b. Do the limits of the concession are clear and correspond to the contract?
- c. Does the concession have physical delimitation?
- d. Do you have conflict with adjacent concessions?
- e. Do you have problems of invasion or robbery in the concession?
- f. Has the concession contract helped to decrease the problems of invasion?
- g. Does the size of the concession have been reduced since you have the contract/why?
- h. Is the concession superposed to other land uses such as agricultural field from other user?

## Relation between concessionaires and other actors from the chains

- a. Have you received technical or financial assistance from ONG, association or firms?
- b. Have you ever participated in workshop/ organized by who?
- c. Are these workshops understandable and useful?
- d. Have you ever had problems with workers contracted for Brazil nut or timber harvesting?
- e. Do you need credits from a firm to finance the zafra?
- f. Is the concession certified?
  - a. What benefits do you get from the certification?
- g. Are you a member of a Brazil nut association?
  - a. What are the benefits you get from the association? or
  - b. Why don't you want to be a member?

## Threats to Brazil nut forest

- a. Have you perceived more shift of land use in Brazil nut concession in the last 5 years?
- b. Do you think illegal harvesting has decreased since the implementation of the concessions?
- c. Do you know concessionaire that has sold/converted the concession?

## Future of the concession and children interest

- a. Do you work with your children in the concession?
- b. Do they know as much as you on the management of the concession?
- c. Do you have children interested in the concession?
- d. Do you plan to transfer the concession and to who?

## Annex 2: Limitation of the methodology

There are some limitations in the methodology that should be acknowledged.

First the fact that the concessionaires were selected through snowballing can be associated with bias in the results. As it was explained before, to tackle this problem I selected an equative number of concessions close to the highway and more isolated concessions. Yet the sample fifty-fifty may not be the more representative one as there are more concessions far away from the highway than close to it. In that zones isolated from the highway the concessionaires may not be concerned by problems of invasion or lack of return from their concessions as it is more interesting for them to go back in town. Yet, this doesn't change the final conclusion of the thesis as the system should promote the sustainable use of forest resources in any concessions, whatever their location.

Second, because of the educational and age heterogeneity of the concessionaires interviewed, the questions were sometimes reformulated for concessionaires with an advance age and low educational level. Especially because their answers were confused and contracting themselves. In that case it was necessary to not respect the order of the questions and go back to previous questions to confirms that the answers were similar.

Third sometimes the concessionaires had the fear that the data of the interviews would be used by NGOs or for the state agencies. A lot of the interviewed concessionaires accepted to be interviewed only because it was for a master thesis and I had no link with NGOs or state agencies. This limitation can affect the results if the interviewed lied on its perception on the regulations or state agencies.

In response to the attitude of concessionaires regarding the fact to be interviewed, I decided to give them something back to increase their truth in investigation. At the end of my stay I gave them a short report informing on a resume of my results and conclusion, common infractions committed in the concessions and their reasons, and a breve clarification on the changes that appeared with the new law 29763.

## Annex 3: Discussion on the theoretical framework

The use of the framework of Ortiz von Halle has allowed to distinguished issues that are critical for the Brazil nut concession system and to answer to the research question.

This framework is particularly useful for this kind of short research because by defining the categories as essential it allows to take conclusion from a first general evaluation. In addition to this, approaching forest governance at the local level allows to identify the more direct causes of what is happening in the forest. However, factors that do not enter in the essential categories institutional arrangements, forest users, and forest products chain can also be essential for the success of local forest governance to promote sustainable forest management. In its framework, Ortiz von Halle consider the characteristics of the resource as an external factor influencing the local forest governance but not essential to make a first general assessment. Yet the results have demonstrated that the instability and periodicity of the Brazil nut play a key role in the issues related to the Brazil nut concession system. As this is proper to the resource characteristic this one should be defined as well as an essential category to assess local forest governance. Especially for governance of NTFPs as Brazil nut because they have proper characteristics that need particular attention. The results confirm previous work on forest governance done by Ostrom (2009) and Agrawal (2001) that define the resource characteristic as an integral category of variables determining sustainability on the commons.