

VU Research Portal

Payments for Forest Ecosystem Services: Global and Local Assessments of Costs and Benefits

Phan Dang, T.H.

2016

document version

Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

citation for published version (APA)

Phan Dang, T. H. (2016). *Payments for Forest Ecosystem Services: Global and Local Assessments of Costs and Benefits*. [PhD-Thesis - Research and graduation internal, Vrije Universiteit Amsterdam].

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

E-mail address:

vuresearchportal.ub@vu.nl

CHAPTER 4 ■

A comparative study of transaction costs of Payments for Forest Ecosystem Services in Vietnam²⁰

Summary

Payments for ecosystem services (PES) often serve multiple objectives, such as carbon emission reduction and poverty alleviation. However, the effectiveness of PES as an instrument to achieve these multiple objectives, in particular in a conservation-development context, is often questioned. This study adds to the very limited empirical evidence base and investigates to what extent Vietnam's move to PES has helped protect forest ecosystems and improve local livelihoods and income inequality. We zoom in on Lam Dong province, where PES was first introduced in Vietnam in 2009. Changes in forest cover are analysed using satellite images over a period of 15 years (2000-2014). Socio-economic impacts are assessed based on rural household interviews with PES participants and non-participants as a control group over a period of 7 years (2008-2014). Our results show that PES contributes significantly to forest cover, the improvement of local livelihoods and the reduction of income inequality.

²⁰ This chapter is currently under review for publication in a journal.

4.1 INTRODUCTION

Forests are vital to human life with regards to the ecosystem services they provide. These services include provisioning (e.g. food, fresh water, wood and timber), supporting (e.g. nutrient cycling and primary production), regulating (e.g. climate and soil regulation), and cultural services (e.g. recreational activities and aesthetics) (MEA, 2005). To better protect and conserve natural forests whilst sustainably exploiting their services, different policy instruments have been introduced, ranging from command-and-control to market-based incentives such as taxes and subsidies. Amongst those, there has been growing interest in payments for forest ecosystem services (PFES) as a potential market-based solution to mitigating deforestation, forest degradation, and biodiversity loss at both global and local level. Although payments for ecosystem services (PES) schemes are generally seen as a suitable tool to sustain ecosystem services, their effectiveness and economic efficiency are still questionable due to a lack of empirical evidence (Muradian *et al.* 2010; Pattanayak *et al.*, 2010; Liu and Yang, 2013; Zheng *et al.*, 2013; Naeem *et al.*, 2015). Recent studies have identified several key issues related to PES, including (assumedly) high transaction costs (Wunder *et al.*, 2008; Vatn, 2010; Tacconi, 2012; Cacho *et al.*, 2013), carbon leakage (Wunder, 2008; Atmadja and Verchot, 2012), additionality (Bennett, 2010), and social equity (Pascual *et al.*, 2010). This paper zooms in on one of these key issues, namely transaction costs (TC). According to Tacconi (2012) and Cacho *et al.* (2013), PES schemes often incur high TC due to (i) the inherent difficulty in measuring and monitoring the actual ecosystem services (ES) being exchanged, and (ii) information asymmetry between ES buyers and providers. Not accounting for TC will lead to overestimation of the cost-effectiveness of PES and inefficient decision-making (Pagiola *et al.*, 2007; McCann, 2013).

So far only a limited number of studies have investigated the TC of PES, ranging from carbon sequestration (Milne, 1999; Cacho *et al.*, 2013; Thompson *et al.*, 2013), to watershed protection (Wunder and Alban, 2008) and bundled ES such as combined watershed protection, landscape beauty and biodiversity conservation (Asquith *et al.*, 2008; Claassen *et al.*, 2008; Frost and Bond, 2008; Turpie *et al.*, 2008). In most cases, these studies seek to quantify the size of TC and identify their distributional effects across the public and private actors involved. TC are found to be highly variable due to external factors such as general socio-economic settings and internal factors such as operational scales related to the payment schemes. Notably, there is neither a universally agreed definition nor measurement method for TC across these studies, i.e. different studies measure different types of TC using their own methodologies, thus complicating comparisons of TC between studies. In many

cases, a lack of sufficiently high quality data on TC is a common challenge to understand their magnitude, role, and significance.

Motivated by the current lack of understanding of PES transaction costs, this study aims to address the above discussed knowledge and information gaps, particularly in the context of PFES. More specifically we examine the costs for payment re-distribution and the enforcement of conditionality. These costs are borne by the same type of PFES scheme coordinators in two different provinces in Vietnam where the country's oldest PFES schemes are found. The coordinating organization involved is the provincial Forest Protection and Development Fund (FPDF), a governmental non-profit agency that coordinates PES programs in Vietnam at provincial level. The main research objectives are (i) to identify and quantify the magnitude of TC borne by the FPDFs, and (ii) to compare and explain differences in TC between the two schemes based on a conceptual framework underlying the key determinants of TC.

The chapter is structured as follows. Section 2 introduces the analytical framework developed for analysing TC determinants in PFES schemes. Section 3 describes the course of data collection in more detail. Section 4 describes institutional settings and procedure of PFES transactions in Vietnam in general and in the two selected case studies in particular, followed by the measurement of TC. Finally, Section 5 concludes.

4.2 THEORETICAL BACKGROUND

4.2.1 Definition and identification of transaction costs in PFES schemes

Generally, the total costs of the PFES scheme include: (i) opportunity costs, i.e. the foregone benefits of alternative land use activities such as agricultural revenues, (ii) implementation costs, i.e. costs directly incurred for implementing the PFES activities such as payments to farmers for forest protection and land use change activities (i.e. reforestation and afforestation) or expenses needed for installing equipment and infrastructure, and (iii) transaction costs (Mburu *et al.*, 2003; Adhikari and Lovett, 2005; Wunder *et al.*, 2008). However, the boundary between implementation and transaction costs is not always clear and sometimes overlaps, making it difficult to clearly identify and measure TC in practice. For instance, Grieg-Gran and Bann (2003), McCann *et al.* (2005) and Thompson *et al.* (2013) suggest that in the case of public policies, PES or projects aimed at reducing emissions from deforestation and degradation (REDD) transaction costs also emerge during the implementation phase.

Various definitions of transaction costs (TC) are available from the literature. TC are often described and defined in accordance with the activities involved within PES schemes (Landell-Mills and Porras, 2002). These activities and associated costs include search, negotiation, contracting, implementation, verification, certification, monitoring and enforcement costs (Grieg-Gran and Bann, 2003; Wertz-Kanounnikoff, 2006). Another way to categorize TC is to focus on the timing when costs occur, such as one-off start-up (e.g. search, design and negotiation costs) and recurrent costs (e.g. monitoring and enforcement costs), where the former often occur *ex ante* the transaction's operation and the latter come about *ex post* (Wunder *et al.*, 2008). Lastly, TC can also be defined and classified based on their distributional effects across public and private participants in a transaction such as public (e.g. policy formulation and administrative costs) and private costs (e.g. information costs) (Krutilla and Krause, 2011).

In this study, we focus on characterizing and quantifying TC incurred along the transactions made between ES providers and ES users. Here we define a typical PFES transaction following Wunder (2005) as a two-way procedure, where ES buyers offer payments to ES providers, if and only if ES providers are able to adequately deliver the ES of interest to the buyers. ES providers are checked by external parties if they comply with the contractual agreements. Our focus therefore is on the TC associated with these two main activities, namely (i) the re-distribution of payments across ES providers, and (ii) the monitoring and compliance checking of the contracted parties through field visits and carrying out forest inventories.

4.2.2 *Conceptual framework*

In order to explain variations in TC between the organizations that are responsible for the operation of the provincial PFES schemes in Vietnam, we adopt an analytical framework based on a combination of theories developed by Williamson (1979, 1996), Antinori and Sathaye (2007), Mettepenningen and van Huylenbroeck (2009), Coggan *et al.* (2010, 2013) and McCann (2013) (see Figure 3.1). In this framework, three main groups of TC determinants are identified, related to the characteristics of (i) the specific transaction, (ii) the transactors involved, and (iii) the institutional design surrounding the transaction. In addition, it has been argued that general scheme characteristics that do not directly belong to one of the specific groups of characteristics listed above such as site accessibility and scale or area size may also influence TC.

Applied to PFES schemes, the first group of driving factors, *transaction* characteristics, is characterized by six sub-groups: asset specificity, uncertainty, frequency, duration, payment mode, and co-objectives. Asset specificity refers to the extent to which a transacted good can be redeployed to alternative uses or by alternative users without loss of productive value (Williamson, 1979). Uncertainty implies the unpredictability in determining transaction outcomes (Coggan *et al.*, 2010). Frequency indicates how often the transaction is undertaken, e.g. one-off versus recurrent, while duration refers to the time horizon of the transaction, e.g. long-term versus short term. The last two factors, i.e. payment mode (cash versus in-kind) and co-objectives (in addition to the provision of ES) are new elements we factor in as typical features of PFES transactions.

The second group of driving factors, *transactor* characteristics, comprises (i) the number, origin, and functionality of transactors, (ii) the bounded rational and opportunistic behaviour of these transactors, and (iii) social capital and built-up networks through past experiences of working together. The first sub-group is new and not mentioned explicitly in the existing literature. The number, origin (e.g. local versus foreign), and functionality (single versus multiple roles) of transactors are expected to have an impact on TC and are often more easily measured in practice than the other two sub-groups. Opportunistic behaviour occurs when transactors are strategically self-interested, while bounded rationality acknowledges the fact that people have a limited ability to handle all the available information (Slangen *et al.*, 2008). Social capital can be represented in forms of trust, reputation, reciprocity, common ideology, shared norms and values, and social connectedness within the community (Bouma *et al.*, 2008). Past experience indicates the level of familiarity of working together between PES stakeholders or with the scheme.

Related to the third cluster of driving factors, i.e. the *institutional* embedding and arrangements in which the transaction occurs, here McCann's (2013) definition is adopted where institutional factors are described as property rights, existing legal systems, market structure, administrative boundaries, choice architecture, and the use of intermediaries.

Applying this conceptual framework to this, we are able to find information about the following factors, representing each group of drivers: payment mode and frequency, the PFES scheme's duration and co-objectives; number, origin, functionality, and past experience of PFES participants; property rights to the forested land; and the scale of operation (see Figure 4.1). The PFES schemes are very similar in the following features: payment mode (cash), scheme's duration (indefinite), co-objectives (besides the provision of forest ES also the inclusion of minority groups and poverty alleviation); transactors' origin

(local ES providers and domestic ES buyers); functionality and past experience; and the broader legal-institutional embedding, i.e. the two schemes originate from the same regulatory framework. In most cases, working experiences with the provincial FPDF prior to the implementation of the PFES scheme are very limited. The FPDF was set up specifically to coordinate the introduced PFES scheme in 2009 and therefore all participants have in principle the same amount of experience working together. Relating functionality, the two FPDFs hold similar rights and responsibilities. Forest area size is only slightly different between the two provinces. The PFES schemes differences in terms of payment frequency, number of participating farmers, and property rights are assumed to play a significant role in driving the TC magnitudes of the two FPDFs. No information could be found to practically measure and assess asset specificity and uncertainty, bounded rationality and opportunistic behaviour of transactors, social capital, and site accessibility.

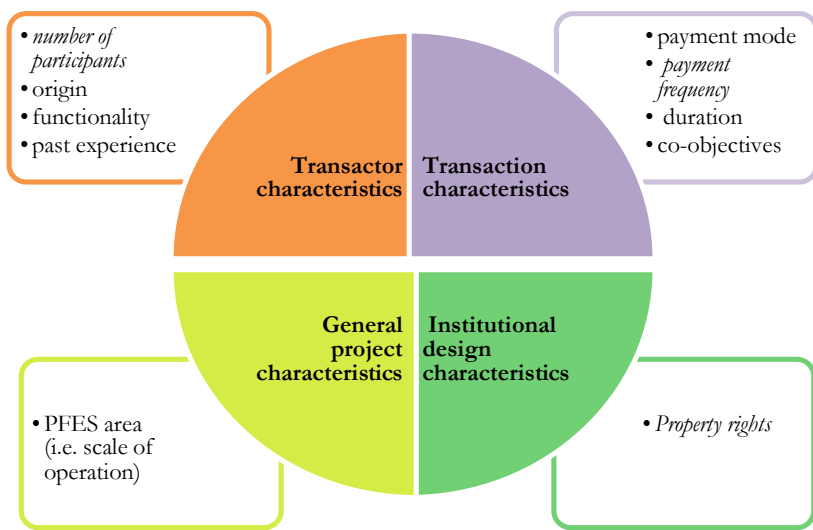


Figure 4.1 Driving factors of transaction costs applied to the PFES schemes in Vietnam. *Note: main focused factors are indicated in italic.*

Before turning to the specific characteristics of the case studies to which the framework was applied, we first discuss our prior expectations with regards to the direction of influence of the above-mentioned driving factors based on the existing literature. Starting with the characteristics of the transaction, different arguments have been put forward in the literature to explain the impact of transaction frequency (i.e. how often the transaction is undertaken) on TC. Williamson (1985) assumes a positive relationship between TC and

transaction frequency as a result of the additional costs of re-doing the transaction. The opposite is expected by Vatn (2005), Rørstad *et al.* (2007), Mettepenningen and van Huylenbroeck (2009) and Coggan *et al.* (2013), who suggest that TC can be reduced by having frequent and long-term transactions, due to enhanced trust and contact, the ability to re-deploy knowledge, and standardized transaction processes.

The number of participants is believed to increase TC as a result of the required extra coordination and institutional arrangements (e.g. Wunder, 2005; Engel *et al.*, 2008; Brouwer *et al.*, 2011). As pointed out by Jack *et al.* (2007), in the context of forestry management where forest land is often owned and used by numerous individuals, implementation, monitoring, and enforcement costs can be high if contracts are signed with individual land owners and land users. This can in turn hamper PES cost-effectiveness, causing a potential trade-off between poverty alleviation, social equity, and cost minimization if the PES scheme aims to be at the same time inclusionary and improve the livelihoods of local households using the forest (Wunder *et al.*, 2008; Farley and Costanza, 2010).

Property rights are also expected to act as a key driver in relation to TC, both directly and indirectly. For example, when there exist customary (common) property rights, TC are predicted to be higher compared with a situation where commodity ownership is officially assigned (Vatn, 2010). Indirectly, different types of property rights (e.g. collective versus private) can impact the number of participating farmers, which in turn can influence the size of TC. As argued by McCann (2005), property rights and other institutional factors may be of more importance than factors that are traditionally assumed to affect TC, such as transaction frequency, uncertainty related to the causal relation between PES activities and ES provision, and hidden information due to a transactor's opportunistic behaviour.

4.3 DATA COLLECTION

In order to obtain data on the TC related to the operation of the PFES schemes, data collection focused on the FPDFs in the provinces Lam Dong and Son La and included in-depth interviews with representatives from these provincial FPDF's. The two provinces were selected because this is where the two oldest and most mature PFES programs in Vietnam are found and thus the expectation was that they would be able to provide the necessary data and information. Semi-structured interview protocols were used with mostly open-ended questions to obtain information related to the general setting of the PFES schemes, their organizational structure, and the TC that facilitate the transaction procedure, especially

the payments to ES providers, and the monitoring and enforcement activities. For each location, four in-depth interviews were carried out with FPDF staff in the period October-November 2014, one with the director and three with the chiefs of the departments of finance, monitoring and planning. In addition, information was extracted from the annual reports of the FPDF and the local forest management boards, which also contained data and information about the achievements of the PFES schemes in the two provinces.

The open-ended interviews consist of three main parts (see Annex C). The first part asks interviewees questions about the general organizational characteristics such as the FPDF's legal and institutional establishment, their role, rights and responsibilities, the number of departments and staff and their designated functions. The second part contains questions focusing on the current PFES scheme, such as the numbers and types of ES buyers, sellers, and providers, existing procedures within the PFES schemes, payment rates and payment frequencies. Part three is exclusively devoted to the measurement of TC, related to PFES implementation, monitoring and enforcement. Interviewees were first asked to identify the various steps within the PFES scheme, then identify the different types of costs involved and the steps that induce the highest TC and why. Once these steps were clear and clarified, interviewees were asked to provide more detail about the number of personnel, time, and money devoted to each of these steps, both internally and externally of their organization. In the latter case, certain activities were carried out by hiring people or organizations from outside the FPDF. In order to check and validate the answers and allow for a comparison between the two provincial coordinating organizations, the same questions were used for all four interviewees and where possible double-checked with the available annual reports and other internal documents that were supplied. The semi-structured interview protocol is available from the authors upon request.

4.4 RESULTS

4.4.1 General description of the PFES schemes in Vietnam

Before the introduction of PES, several incentive-based forestry programs have been implemented in Vietnam, of which Program 327 (1993-1998) and 661 (1999-2010) are the two largest and most important ones. These programs sought to protect large areas of forest in vulnerable areas under pressure of deforestation by issuing forest contracts to different actors who were paid for protecting forests and planting trees (To, 2007). However, due to low payment rates and lack of long-term funding sources, continuation of these programs was not financially feasible. PFES was hence established as an alternative to these earlier

national forestry programs. In 2008, the Vietnamese government issued Decision 380/QDTTg (hereafter Decision 380) as the first national legislative framework that provides a general institutional arrangement in support of PES schemes. In early 2009, two pilot projects were introduced in the provinces Lam Dong and Son La as a preamble to a nationwide PES program. In 2010, Decree No. 99 mandated the nationwide implementation of PFES (from January 2011 onwards), making Vietnam the first country in Asia to initiate a national PFES scheme (Pham *et al.*, 2013).

Lam Dong and Son La were selected as pilot areas for PFES implementation for a number of reasons. First, these two provinces are amongst the provinces with highest forest cover in the country (CIFOR, 2012). Secondly, the substantial number of large hydropower plants in these two provinces enabled finding potential ES buyers, hence ensuring essential financial support for the creation of a market (Windrock International, 2011). These hydropower plants are facing problems caused by deforestation and forest degradation, including soil erosion and water shortages in the dry seasons. Thirdly, prior to the PES pilot project, several forestry projects had been launched already in Lam Dong and Son La, both by governmental and (international) non-governmental organizations. The PES pilot project in Lam Dong was furthermore backed up by the Windrock funded Asia Regional Biodiversity Conservation Programme, while the PES pilot in Son La was supported by the German Agency for International Cooperation (GIZ), both financially and technically (Nguyen, 2011). Last but not least, PES policy in Vietnam foresees the inclusion of ethnic minorities as an important co-objective. The large shares of ethnic minority groups found in Lam Dong (20%) and Son La (28%) thus are expected to increase the chances of getting minority people to participate in PES (Pham *et al.*, 2013).

Although these two PES schemes were introduced in Lam Dong and Son La at the same time and the payment mode (cash), duration (indefinite), co-objectives (poverty alleviation, participation of ethnic minorities), and forest areas are relatively similar, there are still considerable differences. These range from the types of ES transacted, participating parties (number of ES buyers and ES providers/sellers) to payment features such as payment rate and frequency. This is summarized in Table 4.1.

Table 4.1 Comparison of key PFES scheme characteristics in Lam Dong and Son La

	Lam Dong	Son La
Type of transacted ES	Water supply and regulation Soil protection Landscape beauty	Water supply and regulation Soil protection
Number and type of ES buyers	14 hydro power plants, 10 water supply companies, 12 tour operators	28 hydro power plants, 2 water supply companies
Number of FPDF staff	31	60
Number of participating farmers	14,267	63,814
Total PES forest area (ha)	356,833	418,883
Average forest area per household (ha)	25.01	8.44
Average payment rate (US\$/ha/year)	2013: 17.7 2014: 18.9	2013: 10.4 2014: 10.0
2014 average payment received per household (US\$)	473.0	84.2
Payment frequency	Quarterly	Annually

Source: own research

With regards to ES buyers, although the number of participating hydropower plants is twice as high in Son La, Lam Dong has 5 times as many participating water supply companies. Furthermore, contrary to Lam Dong, Son La has no tour operators as ecosystem service buyers since it does not have scenic beauty in its portfolio of ecosystem services. The total area of forest under the PFES schemes is relatively comparable, but the number of participating farmers is more than a factor 4 higher in Son La than in Lam Dong. As a result, the average forest area per participating household is lower in Son La than in Lam Dong. The number of participating farmers also influences the number of staff employed by the FPDF. The larger number of participating farmers in Son La requires twice as many staff members in Lam Dong.

Regarding payment rates, the PFES participants in Lam Dong receive a considerably higher payment per hectare per year than participants in Son La. The difference is almost a factor 2 in 2013 and 2014. This does not, however, result in a higher participation rate for reasons that will be further explained below and in the next section. The payments are only limited incentive-compatible. Together with the higher area size of forest assigned to each

household, this yields on average a substantially higher amount of money received per household per year in Lam Dong than in Son La.

The general institutional setting of the PFES programs in Vietnam is presented in Figure 4.2. It is important to note that PES in Vietnam is not a completely voluntary, bottom-up organized transaction as originally defined by Wunder (2005). The PFES organization entails governmental, top-down interventions, especially in designating ES buyers and approving payment rates (Pham *et al.*, 2013; Suhardiman *et al.*, 2013). The four main participating actors are ES buyers, ES sellers, ES providers, and intermediaries. ES sellers are not necessarily the same as the ES providers, while the ES buyers are not the only ES beneficiaries. Their clients (water and electricity consumers and tourists) are too, but not included in Figure 4.2 to not unnecessarily complicate the flow diagram.

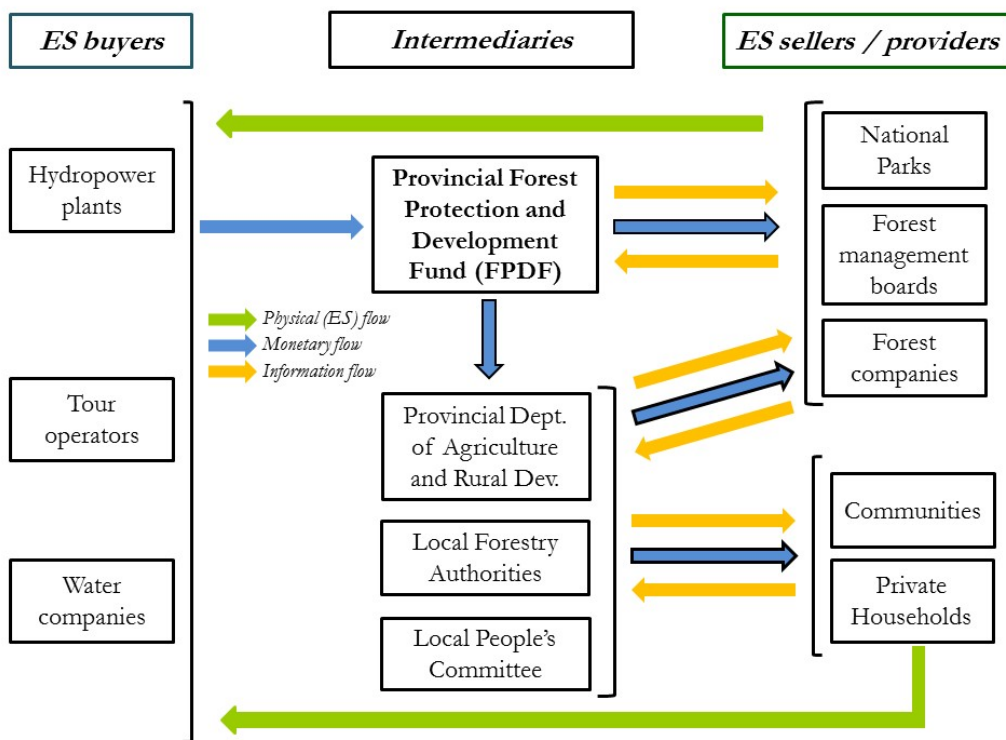


Figure 4.2 The institutional setting of PFES in the case studies

As stipulated in Decision 380, three main types of ES buyers are identified that are allowed to participate in the PFES schemes: hydropower plants, water supply companies, and tour operators. ES sellers are official forest owners, ranging from state and privately

owned organizations to individual households, groups and communities. Two different types of ES providers can be distinguished, depending on the entitlements to forest land. First, if households who own the forest also take care of it, then the ES sellers and ES providers will be one and the same agent. In contrast, when forest owners do not directly carry out the activities eligible for funding under the PFES scheme, but sign contracts with local farmers to undertake these for them, the actual ES providers will be the contracted farmers. In Lam Dong, there are 1,800 farmers as individual forest owners who have a direct contract with the People's Committee at village level, while this number is nearly 30 times higher in Son La.

Important to note is that the PFES schemes could not have been implemented in Vietnam without the engagement of various intermediate parties. Amongst those, the provincial FPDF plays the most important role in coordinating all PFES-related activities. As stated in Decision 380, the FPDF is a non-profit, governmental agency with the main task and responsibility to help connect ES buyers and sellers, and implement PFES at provincial level. Its legislative rights and responsibilities are clearly defined in Decision 380 and include deciding on payment rates, managing PFES revenues, evaluating the performance of the ES providers, reducing or refusing payments in case ES providers violate forest agreements, collecting and re-distributing payments, monitoring and enforcing the implementation of the field activities, and reporting PFES progress to the national FPDF and other governmental departments (Nguyen, 2011). It should be noted that there are other supporting intermediaries involved in accommodating PFES activities as well, such as the People's Committee, the Department of Agriculture and Rural Development (DARD), and local forestry authorities at provincial, district and community level. These parties are also actively involved in allocating payments to ES providers and carrying out monitoring and enforcement activities under direct coordination of the FPDFs. Without the facilitation provided by these intermediaries, PFES participants are expected to encounter a number of challenges to find each other and carry out the activities and transaction in accordance with the legal framework (Pham *et al.*, 2010).

Regarding the financial flows, Circular 85 (2012) sets out clear regulations on how the revenues are to be managed and shared between different stakeholders. The FPDF collects money from ES buyers via a bank transfer. As indicated in Decision 380 and later on in Decree 99, Vietnam's PFES policy applies a fixed payment rate for hydropower plants (20 VND per kWh), water supply companies (40 VND per m³ of clean water) and tourist operators (1-2% of gross revenues), allowing payments to be internalized in the price of electricity, clean water and entrance fees, respectively. Fifteen percent of the PFES gross

revenues can be legally retained by the FPDF as compensation for their operation costs (10%) and to contribute to a reserve or contingent fund (5%) in case of any natural disasters occurring such as droughts or hurricanes leading for example to excessive forest losses (Decision 380, 2008). The operation costs include salaries, annual trainings, the purchase of equipment and facilities, and other expenses. The remaining payments are to be allocated to ES providers in two ways. If ES providers and forest owners are the same party, they receive 85 percent of the gross revenues. If ES providers are contracted by forest owners, they receive 76.5 percent of the revenues as the forest owners are allowed to keep 8.5 percent of the gross revenues to cover their operational costs.

4.4.2 *Measuring transaction costs*

TC related to two main coordination activities were measured, i.e. (i) the re-distribution of payments across ES providers and (ii) monitoring and compliance checking of the contracted parties. TC related to the handling of money re-distribution refer to costs incurred for relocating the payments made by ES buyers from the FPDF to the ES providers (Figure 4.2), in most cases individual farm households. In Lam Dong, this happens every 3 months and in Son La once per year. Additionally, money is redistributed to the ES providers and sellers through other intermediaries, who also help and assist in transferring the payments to the contracted forest owners. It is the TC associated specifically with these redistributions that are of prime interest here (the blue arrows with a black outline in Figure 4.2)²¹. Meanwhile TC related to the monitoring and enforcement step are costs incurred for field visits and checking of PFES activities undertaken by the ES providers. This task is carried out once per year in both provinces, where randomly approximately 10 percent of the total PFES area is visited. The costs associated with these activities are in their entirety considered TC. The measured TC for each activity are summarized in Table 4.2.

All costs are measured in monetary terms as total TC for the year 2014, presented as 2014 US dollars²². The results presented here, on a total TC basis, show the same patterns as when the TC are expressed on a per hectare basis in order to account for potential differences in economy of scale (see Annex B for results of TC per hectare). TC in the pilot phase 2009-2010 could not be retrieved and measured because respondents do not have data

²¹ We do not trace back transaction costs related to the simple bank transfer of the payments from ES buyers to the FPDF.

²² Costs were originally measured in VND and converted into US Dollars using the World Bank's exchange rate (<http://data.worldbank.org/>). In 2014, US\$ 1 equalled on average VND 21,148.

records and cannot recall the costs they incurred 5 years ago. Moreover, the operations carried out by the FPDF were not fully developed yet then. Monetary costs were obtained by summing up total salary expenses and any other costs specified by the FPDF staff. We calculated total salary expenses by multiplying the number of person-days with the salary rate per day based on information provided by the FPDFs. The FPDF representatives were asked to report the number of staff involved in and days spent as well as their monthly wage.

Furthermore, we also make a distinction between TC that are paid internally inside and externally outside the FPDFs. While internal TC are the costs paid to staff within the FPDF, external TC occur when the FPDF has to hire and pay people from outside the organization for the above-mentioned activities. As can be seen from Table 4.2, for the payment re-distribution, the FPDF in Lam Dong and Son La make use of both internal and external personnel. Both FPDFs have to hire personnel from the local People's Committee and forest authority to help with allocating payments to ES providers. The aggregated number of internal staff and externally hired personnel is 367 and 560 for Lam Dong and Son La, respectively, while the total amount of time needed to carry out this activity every year is two times higher in Lam Dong than in Son La (4 instead of 2 months). For monitoring and enforcement, this step requires the input of 31 people (7 internal and 24 external) in Lam Dong and as many as 500 in Son La, all of which are external. So far, compliance checking in Son La has been undertaken exclusively by the local forest authority. These authorities are paid by the FPDF an amount of US\$ 0.28 for each hectare they visit and evaluate. The FPDF in Lam Dong has to hire external personnel from the DARD and the local forest authority. The difference in the period of time needed to monitor and check compliance between the two provinces is relatively small as this activity takes place over 3 and 4 consecutive months in Lam Dong and Son La, respectively.

For the re-distribution of payments, the TC in Lam Dong are two times greater than in Son La whereas the TC related to monitoring and enforcement exhibit an opposite trend, i.e. the TC in Son La are 1.4 times higher than in Lam Dong. Overall, the sum of TC in the two steps is almost two times higher in Lam Dong than in Son La. In addition, both FPDFs are fully utilizing their own staff and also rely on external help to allocate the PFES money among the scheme participants and TC tend to be unevenly distributed between internal and external expenses. In both cases, the costs of externally hired assistance for money re-distribution are several factors higher than the internal costs. For compliance checking Son La relies completely on external parties and thus the TC relate entirely to external personnel, while Lam Dong primarily uses internal staff (100% and 68% of total monitoring and enforcement costs, respectively).

Table 4.2 Transaction costs, their distribution across internal and external activities and share in total operation costs in the two PFES schemes in Vietnam in 2014 (thousands US\$)

	Re-distribution of PFES payments			Monitoring and compliance checking			Total sum	Share in total operation costs
	Internal	External	Total	Internal	External	Total		
Lam Dong	27.8 (10%)	240.1 (90%)	267.9 (100%)	5.9 (68%)	2.8 (32%)	8.7 (100%)	276.6	44.7%
Son La	34.3 (25%)	104.7 (75%)	139.7 (100%)	0 (0%)	11.9 (100%)	11.9 (100%)	151.6	30.0%

Finally, we also attempted to quantify the share of TC in the total operation costs of the FPDFs. The operation costs are estimated to be 10 percent of the annual gross PFES revenues, as stipulated in Decision 380. Data on PFES revenues in 2014 were also supplied by the two FPDFs. In both cases the shares of TC in the money re-distribution step are considerably higher than those associated with compliance checking. In Lam Dong, the share of TC in the money re-distribution step (US\$ 267,900) is 43 percent while the TC related to compliance checking (US\$ 8,729) account for just over 1 percent. In Son La, these figures are 27 percent and just over 2 percent, respectively. Together, the TC associated with the two activities described above make up 45 and 30 percent of the total operation costs in Lam Dong and Son La, respectively.

4.4.3 Explaining differences in the TC between the two FPDFs

In this section, we aim to further explain the variations observed in the estimated TC between the two FPDFs by employing the analytical framework introduced earlier in the paper. More specifically, we discuss the main differences between the two PFES schemes in terms of their (i) underlying institutional design characteristics, in particular the forest land ownership which is partly historically determined, (ii) the number of participants to reflect differences in transactor characteristics and (iii) the payment frequency as an important transaction design characteristic.

To start off with the first influencing factor, the broader institutional characteristics overlap since the two PFES coordinating institutions originate from the same underlying legal-institutional framework. However, the two provinces in which these frameworks have been implemented are considerably different in terms of forest land ownership. As can be seen from Figure 4.3, whereas forests are mostly owned by state and private organizations such as national parks, forest management boards, and military units (98%) in Lam Dong, individual households and communities are the predominant types of forest owners in Son La (88%). The differences in forest land ownership between Lam Dong and Son La can be explained through a number of reasons. First, the historical land policy of each province has led to distinctive styles of forest property rights. In Son La, the allocation of forest land to households and communities was initiated 25 years ago, immediately after the introduction of the land privatization policy in Vietnam.

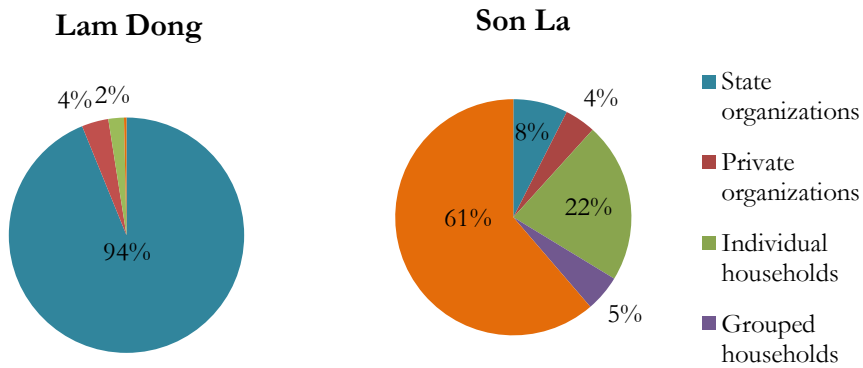


Figure 4.3 Shares of different types of forest owners participating in the PFES schemes by forest area in Lam Dong (left) and Son La (right)

Vietnam began allocating forest lands to households and individuals through the provision of land use rights in 1991, following the success of re-allocating land holdings in agriculture (McElwee, 2012; Suhardiman *et al.*, 2013). The driving force behind this land privatization was the evident crisis in the forestry sector where deforestation rates were high, productivity of state owned forest enterprises was declining, exports of timber were economically insufficient, and large areas of the uplands were bare of forest cover and at risk of soil erosion (Sikor, 1995). As reported in McElwee (2012), in the mountainous North-West region including Son La, nearly 50 percent of all forest lands have been successfully allocated to households and communities, while in the Central Highlands including Lam

Dong, less than 2 percent of the total forest area is held by private parties. Hence, such policy was only modestly implemented in Lam Dong. Instead, forest contracting, a type of co-management where an official forest owner signs a contract with individuals, households, or a community to protect the forest is more commonly seen in Lam Dong since the mid 1990s (Nguyen, 2011). By 2014, more than 90 percent of the PFES area in Lam Dong was assigned to 12,467 farmers through forest contracting. Second, the geographical distribution of forested land between Son La and Lam Dong is also different from each other. Since forests in Son La are highly fragmented over the whole province, it is considered more efficient to allocate forests to local private households and communities given their proximity to the forest. In contrast, Lam Dong's forests are geographically more connected as a whole, making it more efficient to be managed by large organizations with sufficient capacity and personnel. Currently, there are in total over 90 state and private owned forestry enterprises in Lam Dong (McElwee, 2012). These enterprises continue to play a major role in the provincial forestry sector because local farmers, of which 20 percent belong to ethnic minority groups, are incapable of carrying out forest management due to their low education and economic profile.

The above-mentioned historical-institutional background has had a direct impact on the number of participating households. Son La has 4.5 times more households taking part in the PFES scheme than Lam Dong (Table 4.1). The major challenge of having many more participants is that this requires more time, personnel, and money to coordinate activities between the FPDFs and the ES providers, particularly for monitoring and compliance checking. To illustrate this point, given the same frequency of compliance checking (once per year) and relatively equal sizes of forest area, Son La incurs 1.4 times higher monitoring and enforcement TC than Lam Dong. The large number of ES providers combined with the resultant small forest area held per provider (8.44 ha/household) make compliance checking more complicated in Son La. In addition, many participating farmers in Son La are inexperienced with compliance checking, making it also a more time-consuming activity. In contrast, the forest owners in Lam Dong are more experienced with forest inventory and reporting, which helps to make compliance checking faster and more effective, thus reducing TC. Additionally, unexpected extra coordination between the FPDFs and participating farmers often occur, too. Examples include queries by local farmers about their allocated forest area and the amount of payment they receive.

Finally, we discuss the last influencing factor, namely payment frequency. As mentioned earlier, the frequency of the payment re-distribution step in Lam Dong is 4 times higher than in Son La. As a result, the TC related to this activity are also consistently higher in Lam Dong than in Son La (Table 4.2), even though the latter has 4.5 times more participating farmers than the former. This finding implies that all other things being equal, the greater the payment frequency, the higher the TC. This confirms the assumption found in Williamson (1985), who expected transaction frequency to raise TC as a result of re-doing the transaction.

4.5 CONCLUSIONS AND DISCUSSION

Despite substantial attempts to evaluate the cost-effectiveness of PFES by researchers and practitioners, our understanding of the TC involved is far from complete, among others due to a lack of data and systematic analysis. PFES schemes and the associated TC are often highly context-dependent and information about TC is generally speaking not easily retrieved or shared. This study aims to add to the limited empirical evidence base and fill this important knowledge gap about PFES transaction costs by analysing data collected from the two oldest PFES schemes in Vietnam. The main objective was to quantify and compare the magnitudes of TC associated with the transactions between ES buyers, providers and the FPDFs as the key coordinator. In view of the fact that all expenses incurred by the provincial FPDFs are by law automatically deducted from the ES buyers' payments, the TC examined in this study are borne entirely by the ES buyers. Furthermore, as Vietnam's PES policy permits payments to be internalized in the price of electricity, clean water and forest entrance fees, the actual TC payers must (partly) be the end-users or consumers of these ecosystem services.

By zooming in on the emergence of TC, we recognize that positive TC, often referred to in the economic literature as a deadweight loss are not necessarily an indication of the scheme's inefficiency. As stated in Buitelaar (2008: 181), "there is an explicit trade-off between what you want to achieve and what that would cost in transactions" and one should acknowledge the fact that "everything has a price [i.e. the transaction costs]". Given the immaturity of PES markets and a centralized political system in developing countries, aiming for a purely voluntary and perfect PES market with zero transaction costs seems to be unachievable. In the specific context of PFES in Vietnam, we consider the occurrence of those TC necessary to achieving the PFES' environmental and social objectives and hence propose that TC should rather be viewed as a functional cost. Regarding the environmental

objectives, compliance checking and the associated TC are needed in order to meet the conditionality criteria of PES transactions. In relation to social objectives, although the quarterly payment is accompanied in Lam Dong with considerable TC, it is nevertheless perceived financially worthwhile for households to participate. Receiving PFES payments every 3 instead of 12 months helps them to handle their children's tuition fees, daily expenses, and purchase of agricultural inputs. The large number of private households involved in Son La does not permit paying farmers on a quarterly basis as in Lam Dong, not to mention the small amount of payment farmers would receive every 3 months (on average US\$ 21.06 per household per quarter).

Nevertheless, there seem to be some opportunities for reducing TC and we present here the following policy recommendations based on our understanding of the current situation in the two schemes. First, regarding the large number of individual participants in Son La, using group contracts instead of the current individual contracts between farmers and official forest owners seems an effective instrument to reduce total TC. For the sake of efficiency, farmers should be effectively grouped based on the relative location of their forest to each other, in order to reduce travel time of forest visits. At the same time, through group contracts money can be re-distributed to the group representatives nominated by the group members to save on time and personnel. This obviously requires trust and transparency within the group. Our second recommendation is to make better use of remote sensing techniques and Geographic Information Systems (GIS), since these are expected to help (i) bring down TC considerably as a result of less need for field monitoring (Banks-Leite *et al.*, 2015), and (ii) facilitate efficient and accurate monitoring of forest areas, boundaries, and forest quality. For example, the PFES scheme in Son La is mainly based on existing records of a household's land allocation in the early 2000s, which is considered not accurate and up to date anymore for precisely identifying forest areas and boundaries (To *et al.*, 2012). Both FPDFs reported that remote sensing techniques have been utilized to a limited extent due to lack of expertise and facilities.

Finally, the results presented in this study are amenable to a number of improvements as well. First of all, our estimates do not account for all components of the total transaction costs. Since we only focus on the two major components of the TC (i.e. money-redistribution and compliance checking), our cost estimates are expected to be somewhat lower than the total TC in reality. However, because these are the two most important TC components, adding more components is unlikely to change the main findings concerning the magnitudes and determinants of TC.

Secondly, we presented here two specific case studies and these specific cases cannot and will not adequately reflect the situation more generally of TC in the context of PFES schemes. It would be beneficial to compare the PFES schemes in Lam Dong and Son La with other domestic and international cases to further test the role of intermediary parties like the FPDF. What is important here is that similar research designs are used and we are more than happy to share our survey design with others. Such a comparison could yield useful insights into the potential trade-offs of including more or less intermediaries in PFES programs, which then shed lights on how to optimally design PFES schemes.

Thirdly, the estimated costs were primarily based on respondents' statements whose credibility is hard to verify rather than non-subjective information (Boerner and Macher, 2002). The use of self-reported data and information is an important challenge faced by TC researchers, owing to the fact that information is not openly available and often mixed up with other types of costs. To deal with this problem, we tried to design a well-structured open-ended interview protocol, clearly explaining the various cost components we were looking for, and equally important, a well-defined measuring procedure for TC.

Fourthly, there are quite a number of relevant factors that were overlooked in the study while explaining variations in the TC between the two FPDFs. These less visible and tangible factors include the boundedly rational and opportunistic behaviour of transactors and social capital and would have required a more longitudinal research methodology. In the fifth place, due to time constraints, it was not possible to measure the TC incurred by other parties such as the contracted farmers. We hence somewhat missed the distributional effects of TC across different actors. Finally, due to a lack of data, we were unable to test how effective the two PFES schemes were in reaching both the environmental and social objectives.

Acknowledgements

The work presented in this paper was funded by the Innovation Research Incentives Scheme (VIDI) of the Netherlands Organisation for Scientific Research (NWO). The authors are grateful to (in alphabetical order): Mr. Dai Nguyen, Mrs. Hanh Nong, Mrs Huong Vu, Mr. Quang Nguyen, Mr. Thanh Pham, Mr. Thang Le, Ms. Thao Nguyen, Mr. Tho Vo for their willingness to participate in this study and making time available for the interviews. We thank Dr. Hoanh Chu, Dr. Tuan Tran, and Dr. Viet Nguyen for their support and advice in planning and organizing the fieldtrips.