

RESEARCH ARTICLE

In PES we trust: but do farmers?

A case study of biodiversity protection in Nicaragua

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ABSTRACT

Payments for environmental services (PES) have been touted as a solution for environmental protection under conditions of weak governance in developing countries. The question is, however, if weak governance might instead indicate poor conditions for successfully implementing PES. This was investigated via a case study of a PES pilot project in South-Eastern Nicaragua, where government authorities have sparse resources and little presence, and where early indications suggested that trust was an issue for PES participation.

Field work was conducted among PES participants and former candidates for participation to shed light on the role of trust and its possible links to governance. This was done by investigating the recruitment process of the PES pilot project and the local institutional setting and history, suggesting that a history of poor rule of law and weak governance had contributed to this.

The study thus indicates that under conditions of weak governance, trust will be an important participation constraint due to the links between generalized trust, rule of law, weak governance and the building blocks of PES initiatives: property rights and private contracts. This finding occurs in the face of convincing economic benefits for participants and widespread poverty in the case study area.

Keywords: rule of law; social capital; payments for environmental services; weak governance; Nicaragua

1. Introduction

Payments for environmental services (PES) have in the recent decade been taken to heart by major development assistance stakeholders such as the World Bank (e.g. Pagiola *et al.* 2005), donors and non-governmental organisations (NGOs). Defined as a voluntary transaction between at least one buyer and one seller with payment conditional on contract compliance over a well-defined environmental service or its proxy (Wunder 2005), PES are seen as attractive for four reasons primarily: i) their potential for environmental service (ES) delivery, where traditional commodity markets have failed; ii) their perceived potential to deliver poverty alleviation; iii) their theoretical superiority to command-and-control C&C regulation in terms of cost-effectiveness; and iv) their potential to operate under conditions of weak governance, which make C&C unfeasible.

Originally contemplated to deal with public goods and externalities escaping address in conventional markets (Coase 1960), payments for environmental services (PES) seek to reward suppliers of positive externalities or compensate their reduced productivity as a consequence of increased ES delivery. Despite historical failure of markets for externalities to form without e.g. government intervention, PES is thought to be an option if initial assistance with market creation is provided (Landell-Mills & Porras 2002). This implied cash or in-kind transfer from buyer to seller of ES is perceived as having the potential for poverty alleviation and has meant that donors and policy makers have seen a large potential for PES in tropical developing countries, where severe poverty often co-exists with high biological diversity (Fisher & Christopher 2007). Also, PES have been argued to be cost-effectively superior to both indirect measures such as integrated conservation and development projects (ICDPs) (e.g. Ferraro 2001; Ferraro & Kiss 2002) and C&C (e.g. Wunder *et al.* 2008). The superiority compared to ICDPs is largely ascribed to the directness of PES relative to the desired objective (ES provision). Compared to C&C the superiority of PES is ascribed to the theoretical superiority of markets in securing efficient resource allocation, i.e. ES provision where this is cheapest instead of imposing the same regulation on everyone, regardless of their cost of compliance. Additionally, the apparent independence of PES with regard to governance has made it seem an attractive solution to ES provision where governments are unwilling or unable to enact and/or enforce adequate environmental regulation (e.g. Pagiola *et al.* 2002; Pagiola *et al.* 2005).

Recent research, however, demonstrates that the practical implementation of PES programmes turns out somewhat differently from theory (Muradian *et al.* 2010; Pattanayak *et al.* 2010; Ferraro 2011): i) markets for ES are less likely to be established or function well without a regulatory framework (Vatn 2010); ii) PES programmes frequently fail to specifically attract poor participants over non-poor (e.g. Zbinden & Lee 2005; Miranda *et al.* 2003) or iii) do so at the detriment of cost-effectiveness (e.g. Wunder 2008; Jack *et al.* 2009); and iv) formal institutions and regulations appear to play a much more crucial role than anticipated in the incipient phases of PES enthusiasm (e.g. Vatn 2010; Muradian *et al.* 2010; Pattanayak *et al.* 2010). PES in its capacity as a market-based mechanism is however still widely proposed employed under conditions of weak governance, conditions which must reasonably be expected to bear some influence on the effectiveness of any government regulation. Based on the dawning realisation of the importance of the formal institutional setting for PES and the continued belief among policy makers and donors that PES is attractive under conditions of weak governance, it merits investigation whether weak governance does indeed imply difficult breeding ground for PES and if so, why.

Social, political and economic research indicates relationships between trust at an interpersonal level, a social/general level and rule of law and governance. Borrowing from these disciplines the present paper hypothesises that similar links have combined to impede PES adoption in the case in question, and that this may not be a singular event, but a relevant risk for all areas characterised by weak governance, i.e. many of the settings where PES is still proposed an attractive alternative to C&C. This is supported by a few other PES studies e.g. Börner *et al.* (2010), who mention trust between buyer and seller as an institutional precondition for PES, as well as enforceable property rights, thus highlighting the importance

of credible institutions to facilitate and guarantee rule of law. Likewise, Asquith *et al.* (2008) mention mutual lack of confidence between local buyers and sellers regarding the other party's compliance with contracts a key constraint in getting PES off the ground in Los Negros, Bolivia. Trust and its possible institutional precondition have however not yet been at the centre of any PES study, and this paper thus contributes to an increased understanding of institutional and governance conditions affecting the adoption of PES.

Also, a trust-related link between weak rule of law and transaction costs is widely recognized (e.g. Fukuyama 2001), although most work has been carried out in developed countries. Still, there are a number of economic studies showing that societies and communities with high levels of generalized trust and social capital enjoy lower transaction costs (e.g. Knack & Keefer 1997; Chiles & McMackin 1996; Dyer & Chu 2003), primarily because less is expended on negotiation, monitoring, litigation and general enforcement of agreements. The paper thus also contributes to identify general and specific institutional conditions which may increase transaction costs of PES significantly.

The remainder of the paper is structured as follows: Section 2 describes the methodological approach chosen, section 3 introduces key trust and governance concepts and the relationship between them as part of the analytic framework. Section 4 describes the case study area in bio-geographical and socio-economic terms, as well as the PES scheme. Section 5 focuses on the institutional context of the case, and section 6 describes the PES participants and control group based on field work. Section 7 discusses the case study findings against the analytical framework and the wider implications, before section 8 concludes.

2. Approach

A case study approach was chosen to allow for in-depth understanding of a case setting stretching from individual behaviour and motivation for PES adoption to more pervasive structures of governance. This means that primarily qualitative methods were employed to characterise the state of governance in El Castillo and the series of events in the concrete case constituting the PES recruitment phase. Quantitative data were collected too, primarily to provide a counterfactual so that economic motivation could be ruled out as the deciding factor in PES participation.

Individual interviews were conducted with 12 PES participant households (100% sampling intensity) and 20 control group households (HHs). Interviews consisted of a semi-structured quantitative part, and an open-ended interview guide to elucidate qualitative information. Present were heads of households. The quantitative part of interviews targeted basic quantitative family and farm characteristics expected to influence the decision to participate in PES, such as HH and farm size, income sources, land use patterns and opportunity costs of participating, as well as membership of formal organisation as a measure of social capital as per Putnam (1993). The qualitative part inquired into reasons for participating (or not), perceived pros and cons of PES, doubts about participating, community involvement, contact with authorities and satisfaction and compliance with PES contracts, as well as a description of the recruitment process for each HH. Control group HHs were selected as nearest present PES-neighbour at the time of the field visits, since there was no practical way of making up-front arrangements and were asked the same questions as the PES participants. Of the control group 12 were HHs, who had previously participated in the PES recruitment process and been willing and eligible to participate up until they realised they needed to lend FdR their deeds for verification. These 12 HHs are singled out as 'selected control group respondents' to imitate matching based on willingness and eligibility to participate. Quantitative analysis of household data was conducted using pair wise t-tests to determine if there were any statistical differences between the PES participant group and the control group. This served the purpose of assessing if the two groups were comparable with respect to basic asset characteristics to exclude these as the rival explanation for the PES participation decision.

Key informant interviews were conducted with local and central public authorities and project staff from donor funded initiatives present and working in El Castillo such as local representatives of Ministry of Environment and Natural Resources (MARENA), Ministry of Agriculture (MAGFOR), FdR, locally anchored donor projects (PRODESOC, PMS, ARAUCARIA), the military, the Municipal Environmental Unit, Nepenthes, FdR and MARENA in Managua. These were interviewed with a view to mapping the recruitment process of the PES initiative, the general socio-economic setting and the local institutional and historical context. This information was analysed with reference to the overall conceptual framework.

3. Analytical framework

The analytical framework of this paper is made up of the relationships between interpersonal and generalized trust, rule of law and governance documented by sociological, economic and political research and which is hypothesized to fit the concrete case study. These concepts thus play a crucial role and are therefore defined and their links expanded upon below.

3.1 Definitions

Misztal (1996) offers a simple, but effective definition of trust as believing that the consequences of someone else's intended action will be appropriate from our own point of view. For the present purpose Gambetta's (2000: 216) more elaborate definition of trust (and distrust) is adopted: "Trust (or, symmetrically, distrust) is a particular level of the subjective probability with which an agent assesses that another agent or group of agents will perform a particular action, both before he can monitor such an action (or independently of his capacity ever to be able to monitor it) and in a context in which it affects his own action". Trust thus informs action (Hardin 2002), guiding the individual choice in accordance with the trust placed in or trustworthiness demonstrated by another party. The latter also stresses (e.g. Hardin 1996) how experience is instrumental in forming trust or indeed distrust. Or as Levi (1998: 78) phrases it: "The initial grant of trust depends on one person's evaluation that another will be trustworthy. Its maintenance requires confirmation of that trustworthiness, or else trust will be withdrawn".

Interpersonal trust is an elusive thing to measure, though, and social capital is often measured in its place. Social capital is linked to interpersonal trust by the former's definition as anything that facilitates individual or collective action, generated by networks of relationships, reciprocity, trust, and social norms (Coleman 1990). It is frequently, although not universally approved of, measured by the number of formal groups that a person participates in (Putnam 1993).

"General trust" is defined as the "default expectations of people's trustworthiness" (Yamagishi 2001: 143) and describes the level of trust with which a relative stranger is met. Typically, it is measured by answers to various versions of the question: "*In general, do you think that most people can be trusted, or can't you be too careful in dealing with people?*" (e.g. Kaufmann et al. 2010).

Weingast (1997: 245) defines rule of law briefly and succinctly as "a set of stable political rules and rights applied impartially to all citizens". Digging into the operational elements of rule of law as employed by e.g. the collaborative World Values Surveys (WVS) conducted by Kaufmann et al. (2010), the governance indicator 'Rule of Law' captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.

UNDP (1997: 55) defines 'governance' as: "the exercise of political, economic and administrative authority in the management of a country's affairs at all levels. Governance comprises the complex mechanisms, processes and institutions through which citizens and groups articulate their interests, mediate their differences and exercise their legal rights and obligations". Paraphrasing the World Bank's (1994: vii) default definition of weak governance reads like: "arbitrary policy-making, unaccountable

bureaucracies, unenforced or unjust legal systems, the abuse of executive power, a civil society unengaged in public life and widespread corruption". The term 'governance' is in this paper consistently used to describe hierarchical, public government structure and its implementation.

3.2 *Links between trust, social capital, rule of law and governance*

Turning the attention from definitions to the theoretical and empirical links between the key concepts above, we are assisted by a large number of studies from primarily the last 30 years. Most empirical work, however, has been conducted in Europe or the USA with the exception of the more sweeping WVS.

Research identifies a number of concrete factors that promote interpersonal trust, including reciprocity, trustworthiness (the demonstrated history of living up to positive expectations), social relations, cooperation, and familiarity (e.g. Hardin 2001; Hearn 1997; Misztal 1996; Coleman 1990). Also, a great number of studies have confirmed that greater equality and similarity between interacting parties increases trust (e.g. Molm et al. 2000; Nee and Sanders 2001; Labonne 2007). This is particularly true for income (in)equality (Bjørnskov 2006; Tsai et al. 2011). Similarly, in an empirical study Alesina & Ferrara (2000) find recent personal history of misfortune and the perception of being part of a discriminated group among the most important factors influencing trust. At the next level of trust, a study by Delhey and Newton (2003) supports the hypothesis that trust increases social capital. Likewise civic participation, the predominant measure of social capital, is found related to the growth of generalised trust by e.g. Stolle (2001), who finds that the greater the number of formal groups a person joins, the more trusting he/she will become. Other recent trust-related literature (e.g. Bjørnskov 2006; Tsai et al. 2010) discuss the lack of empirical evidence for the direction of causal relationships between trust and social capital, not quite settling on a consensus. The close relationship as such is however not in dispute.

Apart from interpersonal experience from e.g. civic participation, Knight (2001) proposes that generalized trust is derived from our assessment of the probability that relative strangers will comply with dominant social norms or the rule of law. This also indicates why generalised trust cannot be seen in the isolation of the trusted and trusting party alone, but has to take into consideration the existence of an external "enforcement agency" that provides a credible threat of sanctioning for non-compliance. Such an enforcement agency must be trustworthy in terms of "doing what it says, and only what it says", but could equally be government (rule of law) or society at large (social norms) (Dasgupta 1988). Knight (2001) elaborates further and states that where interpersonal trust is scarce, legal regulations (rule of law) can satisfy the requirements of social order and cooperation. The realistic chance of sanction by either social or legal means reduces risk of trusting relative strangers and so promotes generalized trust (Berggren & Jordahl 2006). Similarly, Tsai et al. (2011: 317) find evidence in favour of good governance enhancing the level of trust, and elaborate that "Trust is closely related to the rules of the game that a society adopts for exercising governmental authority". In line with this Sztompka (1999) emphasises institutional transparency and accountability as important conducive factors to increased generalised trust. The relation between rule of law and governance (whether good or weak) is made clear by the Institute for Development Studies (IDS 1998 in Furley & May 2006) defining rule of law as a component of governance: "More specifically, this term [good governance] refers to the following things, within civil society and especially within governments: transparency, effectiveness, openness, responsiveness and accountability; the rule of law and the acceptance of diversity and pluralism". This corresponds well to the aforementioned factors influencing both trust in government and generalised trust as such.

4. Case study area

This section introduces the case study in terms of general setting as well as the specific PES scheme implemented and studied.

4.1 Local bio-geographical and socio-economic context

The case study area encompasses five small rural communities (Bartola, La Juana, Boca de Escalera, Bijagua and Romerito) at the agricultural frontier in El Castillo Municipality. The Municipality lies in the south-eastern corner of Nicaragua at an altitude of 50-475 m (Araucaria 2007) and spans 1,656 km². The Biological Reserve Indio Maiz (RBIM) covers 39% of the Municipality. Mean annual temperatures lie around 25°C and annual precipitation around 2,800- 4,000 mm (MARENA 2004), making the natural forest cover tropical rainforest. It forms part of the Meso-American Biological Corridor and was established in 1990. The remaining 61% of El Castillo Municipality is entirely encompassed by the designated buffer zone of RBIM. The buffer zone in El Castillo has seen a decrease in primary/closed canopy forest cover from 85.1% in 1983 to 13.2% in 2002 reflecting a rapidly moving agricultural frontier after cessation of the civil war around 1980. Simultaneously secondary/open forest moved from 29.9% to 18.8% share of land cover, while pasture increased from 18.9% to 22.1% (FUNDAR 2004; FdR 2009).

The Municipality is characterised by high incidence of poverty: 65.7% of El Castillo's app. 22,000 inhabitants are classified by Nicaragua's National Institute of Information on Development (INIDE 2008) as extremely poor. Illiteracy reaches 59% among adults and health, education and general infrastructure is poorly developed as illustrated by the Human Development Index for the Municipality, which is one of the lowest (0.486) in Nicaragua (UNDP 2003). None of the communities in the study area have access to electricity or potable water. Primary school is within reach for most, but often with ½-1 hours walking distance from farms, and health services and point of sales for agricultural products are often 1-3 hours away (one way). Transportation is by foot or beast via muddy tracks used by cattle and man alike, and often implies crossing rivers by foot or improvised bridges. Individual target community size ranges between 34 (Bartola) and 66 families (Boca de Escalera). Main activities are subsistence farming of basic grains such as beans and maize, combined with a bit of extensive cattle ranching.

4.2 The PES scheme

The pilot PES scheme operated from 2007-09 (only one 3-year contract cycle), recruited a total of 12 households and was implemented by Fundación del Río (FdR), a local environmental NGO. The purpose of the PES initiative was the specific protection of the rare Great Green Macaw (*Ara ambiguus*) as well as more general biodiversity conservation through avoided deforestation in the buffer zone. Target communities were chosen based on proximity to RBIM and the registered frequency of Macaw sightings. Both desired services were targeted through the land use proxy 'intact primary forest'. The scheme was intended to continue beyond three years, but only three years funding was secured, so the payments stopped after 2009, to be continued only in 2011/12 after new funds had been accessed. The programme paid a yearly sum of US\$ 30/ha/year for forest conservation and payments were made annually contingent upon inspection of intact forest area compared to a 2006 baseline for each of the 12 participating farms. Eligibility criteria for programme participation were: 1) positive conservation attitude; 2) location in one of five target communities adjacent to the protected area RBIM; 3) verified secure tenure; and 4) presence of intact primary forest on the farm. The programme stipulated enrolment of between 10 ha and 28 ha/farm, and obliged participants to apply for Private Forest Reserve (PFR) status with MARENA. All technical work associated with PFR applications was handled and paid for by the pilot project.

5. Local institutional and governance context

Present day institutional and governance context in El Castillo has been shaped by many factors, ranging from national events such as the civil war spanning almost 28 years to the characteristics of the individual inhabitants. Reflecting the hypothesized steps of the ladder linking governance to trust, an overview is presented here based on review of grey literature, project reports and interviews with key informants during field work.

In the period from civil war cessation to the present, public governance in the area has been somewhat faulty in terms of perceived legitimacy, enforcement, fairness, corruption and consistency. This is primarily illustrated by examples related to natural resource governance because of their importance for livelihoods in El Castillo, and the relevance to PES. During the latter part of Nicaragua's civil war what is now RBIM was a very active fighting zone, which kept the area from being settled and sent many inhabitants fleeing over the border to neighbouring Costa Rica. From a modest pre-civil war population, the major population expansion in El Castillo occurred in two waves. Government institutions slowly followed, but even today land owners at the border of RBIM have an average minimum of 2-3 hours to reach police representation. Similar distances hold for health services and most other public representation.

Land tenure has had a chequered history in El Castillo. The initial colonisation of the area took place already in the 1960s and '70s under the Somoza government as part of a policy to privatise national land, albeit in modest numbers. A more substantial immigration took place under the Sandinista government in the early 1980s as part of an agrarian reform, but was done with disregard for existing ownership of the land. After the defeat of the Sandinistas, the new liberal government similarly instituted an agrarian reform giving 35-50 ha lots to civil war veterans in exchange for their weapons as a means to assimilate these into normal life. This was unfortunately also done with disregard of existing ownership, and conflicts arose aplenty as refugees returned from exile to resume farming their land. During 1995-98, however, internationally funded efforts succeeded in formalising land titles in 25 of the 43 communities of the RBIM buffer zone. This has ensured a higher, *ceteris paribus*, degree of secure tenure in El Castillo.

Exemplifying the lack of perceived government legitimacy is a number of land conflicts in the last 20 years, on several occasions encouraged by community leaders (including religious leaders and politicians) and leading groups of farmers into the RBIM to establish settlements under the justification that the government had no moral right to preserve nature for nature's sake while its people were going hungry. One such event saw the participation of a candidate for mayor in El Castillo. A possible contributing factor to this may be the top-down approach to initial establishment of RBIM in 1990, which was heavily influenced by international donors shaping environmental policy at national level in Nicaragua, as well as policy implementation in El Castillo. The focus of the efforts in El Castillo were the (total) protection of RBIM with corresponding investments in command-and-control enforcement to keep the agricultural frontier in check. Despite this, enforcement efforts have not been adequate in preventing intrusions into RBIM (Barrios & Brogaard 2006; Gomez & Ravnborg 2006; MARENA, undated) and the majority of infractions go unpunished (Environmental District Attorney, San Carlos, personal communication). This is reportedly for two reasons: the accused often have connections within the police or political party system and is able to get off; or the case never reaches the courts because there are no means of contacting witnesses. Furthermore, witnesses are not reimbursed neither time, nor expenses and so do often not show up at all. The perceived consistency and fairness of government policy also suffered a drop in trustworthiness when central government redrew the border of RBIM (Decree 28-94) in 1999 and in one stroke included two larger and several smaller settlements in the Reserve, making these illegal. With the active encouragement of donors, in some cases a condition for continued support, this led to the eviction of the two communities: 80 families in Samaria and 23 families in Nueva Jerusalen. Some of the 80 families evicted from Samaria had land titles issued during the agrarian land reform immediately after civil war cessation. They were convicted of violating environmental legislation and relocated outside RBIM. Shortly after this taking place two buildings belonging to a donor project supporting the command-and-control efforts by MARENA in El Castillo were burnt down.

Formal government institutions have not been alone in raising uncertainty in the area. In 2005 one scam that alone promised more than 500 people free or cheap land in El Castillo (Barrios & Brogaard 2006) caused a small wave of migration to the area. Authorities in El Castillo had to work hard to convince

people it was a scam and subsequently prevent people from settling anyhow. To further complicate matters 2007 and 2008 saw new cases of organized fraud, where local people were “sold” land within the reserve. Some were individual scams, but one notable case was quite organized by way of two large scale meetings advertised in the local newspaper claiming that the organizers acted with authorization from MARENA. This resulted in the sale of 12 lots, whose supposed owners managed to clear 25-30 ha of forest before being discovered and thrown out by joint MARENA, military and police force. The fact that settlers managed to clear 25-30 ha of forest after two publicly announced meetings is an indirect testament to the enforcement capacity of MARENA. Also, in 2007 four long-term settlers with farmed land were encountered, 2006 saw 40 illegal settlers relocated, and 2008 saw 16 illegal settlers encountered and ousted (MARENA, unpublished information). Another procedure for legalizing land titles has also been exploited to appropriate land by persons other than those inhabiting and managing the land (Ravnborg 2006). After searching registers for known farms without land titles, a notice is published supported by alleged witnesses and notarised three times with a ten day period between them. If the real occupant of the land does not oppose this ‘provisional title’ immediately after its publication in the newspaper, the title is given to the new ‘applicant’. Given the remoteness and resources of the typical farmer it is very likely they never become aware that somebody else is applying for a formal title to their land. Theoretically it is possible to protest such a provisional title for 10 years, but it is a difficult and bureaucratic process and after 30 years all rights lapse and a final deed is registered with the applicant. Restoration to initial occupants is even more difficult when it is a powerful person or organization applying for titles on already occupied land.

The abovementioned individual opportunistic behaviours have been preceded by other problematic characteristics of the inhabitants of El Castillo. Together with the absence of authorities this gave rise to many criminal, but often unreported incidents (Gomez & Ravnborg 2006). Also, the heterogeneity of inhabitant increased. Many of the post-war immigrants were poorly suited to the area, having no knowledge of farming, and so turned to criminal/violent behaviour to survive. Anecdotal evidence speaks of assaults or even murders to settle old scores originating from the civil war. Many of the non-fighting original inhabitants of the area also started coming back from regional exile post-war, but were essentially of a different political persuasion and fully capable of surviving by farming the land.

6. PES participation

Having gained an overview of the governance and institutional conditions in El Castillo, the attention is turned to the households faced with the option of joining the PES programme. During field work a control group was selected from the group which went through the same PES recruitment process as the ultimate PES participants did (described below) to match the PES participant group in terms of eligibility and willingness to participate. With the similar purpose of eliminating basic physical household characteristics and opportunity costs as a likely explanation for the different choice to participate or not between the two groups, these have been calculated and contrasted as well. All information stems from field work in El Castillo.

6.1 *The PES recruitment process*

Interviews with key informants during field work provided a description of the PES recruitment process. Recruitment started with a series of meetings called by FdR in the four target communities. The concept and purpose of PES was explained, the source of funding and the conditions upon which payments depended. The meetings were called via advance notice of community leaders and FdRs weekly radio programme. More than 100 people participated in the first round of meetings. Households still interested after the first meeting and fulfilling eligibility criteria were invited to the second round of meetings, which repeated and detailed information. After this 39 interested and eligible farms/households remained and FdR proceeded to verify willingness and eligibility to participate, and started physical delineation of forest areas proposed enrolled. Subsequently contract drafting began using a common template modified

individually with formal information on each farm and number of hectares enrolled. A third and final meeting, where the draft contract was presented, made it clear to participants for what appeared to be the first time for many, that verification of secure tenure meant lending their actual, original land title documents to FdR, with the purpose of checking the authenticity and accuracy of these in the nearest cadastral office in San Carlos 1½ hour away by boat. This realisation caused an immediate reaction from a number of the almost-participants, who both at the meeting and subsequently in their respective communities voiced a strong conviction that the PES programme was revealed as a land grabbing ploy. The most adamant sought proactively to dissuade other potential participants to abandon the programme. Thirteen households eventually signed PES contracts, whereas 26 participants of the original 39 abandoned the programme. Twelve of these 26 were chosen as the control group of the case study (respondents C4, C5, C10-18 and C20) to match PES participating households on eligibility and initial willingness.

6.2 PES participants and non-participants

Comparing key household variables across the PES and control group revealed only three as significantly different at a 95% confidence level: 1) social capital as measured by the number of local community organizations the household was involved with ; 2) contact with authorities; and 3) the number of environmental laws respondents were aware of (Table 1Table). Contacts with authorities were primarily with MARENA and the municipal environmental authorities, and likely the cause for higher awareness of environmental legislation among PES participants compared to the control group

The PES and control group were not significantly different in any of the basic asset and household characteristics. Average PES farm size was higher than control group average, but predominantly due to an isolated outlier with more than 485ha. Households were generally larger in the PES group, although not significantly. A certain self-selection bias may be behind the higher average forest share among PES participants, since land holders with a small forest area may not have found it worthwhile to apply for PES. This higher average forest share among PES participants is also influenced by the 85% forest covered outlier. Still, all respondents had intact forest and thus were eligible for PES participation.

Summary/key variables	PES		CON		t-test P(D<>0)
	Average	Std	Average	Std	
Farm size (ha)	88	128	33	18	83.4%
Household size (persons)	6.5	2.8	5	2.4	86.6%
Education level (weighted)	1.1	1.2	1.0	1.8	15.9%
Community accessibility (distance to key points)	88	73	94	44	19.3%
Forest area share	63%	20%	48%	23%	93.2%
Crop area share (all crops)	6%	4%	12%	13%	91.5%
Animal area share (all species)	16%	15%	16%	24%	1.2%
Fallow area share	15%	13%	24%	19%	86.7%
Income from farm work ex PES: US\$/year	543	621	686	682	44.9%
Income from work outside farm: US\$/year	1076	1738	972	1177	14.5%
Total income: US\$/year	3020	1717	2171	873	86.7%
Total income without PES: US\$/year	2387	1247	2171	873	39.9%
Total income/person: US\$/person/year	493	230	502	253	8.1%
Project participation (ex. PES experience): number	1.17	0.72	1.30	1.13	31.4%
Membership of local organisations: number	0.83	0.39	0.40	0.50	98.9%
Knowledge of environmental regulation: number	0.44	0.26	0.25	0.20	95.8%
Contact with authorities: number	1.17	0.94	0.30	0.57	99.3%

Table 1. PES and control group comparison on basic household characteristics (t-test)

6.3 Benefits from participating in PES

Respondent information on crop and livestock yield, labour input and sales prices were used to calculate gross foregone income for each household (rows 8 and 10, table 2). As seen the payments (30 US\$/ha) were in some cases able to compete directly with gross income from extensive cattle ranching (row 10, table 2). By the same measure PES was no competition for crop cultivation (row 8, table 2). Still, unmodified gross income does not adequately reflect actual opportunity costs, since it fails to account for constraints in either family farm labour (FFL) or capital. Using statements from household interviews on how much land one adult farm worker is capable of cultivating per year (0.5 to 3 hectares), the maximum area that PES households were capable of cultivating was calculated and subtracted from total farm size.

PES group	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
Farm area (ha)	35.9	105.6	482.4	31.7	27.5	45.8	36.6	126.1	39.4	31.7	49.3	40.8
Forest area (ha)	33.0	21.1	410	15.2	11.3	28.4	22.7	76.9	30.3	17.8	32.5	33.9
Min. land buffer (ha)	19.5	37.6	445	24.2	16.0	29.2	20.0	95.7	22.3	14.7	35.9	24.5
PES area (ha)	28.2	9.9	28.2	15.1	11.3	28.2	11.3	20.4	28.2	14.1	28.2	28.2
No. of full-time FF labourers	5	4	6	2.5	1	3.5	2	5.5	4	4.5	3	3
Livestock area (ha)	1.4	56.0	19.3	0	8.5	5.0	10.6	13.9	5.1	3.5	4.4	5.7
Max ha cultivated (ha)	15	12	18	7.5	3	10.5	6	16.5	12	13.5	9	9
US\$ gross income/ha/year: crops	208	130	145	177	431	235	275	305	260	288	144	398
Profit crops w/hired labour	-142	-220	-205	-173	81	-115	-75	-45	-90	-62	-206	48
US\$ gross income/ha/year: cattle	57	22	63	0	24	0	11.5	88	32	105	37	0
Net profit cattle w/hired labour	29	-6	35	-	-4	-	-16.5	60	4	77	9	-

Table 2. Basic household (HH) and land use data: PES group

**Existing livestock area at the time of the interviews (row 6) was subtracted as well from total farm area to give land buffer, ignoring risk of livestock area expansion as this would require capital, which is generally not available to interviewed farmers.*

A positive number would indicate surplus of land ('land buffer' in row 3, table 2), a negative surplus of labour. Comparing the land buffer figure with the forested area on each farm would indicate the risk of the household removing forest to expand agriculture, if forested area is larger than the land buffer. Four households seem in theoretical danger of converting forest to agriculture (P1, P7, P9, P12) based on their FFL supply. If instead the lower value given for an adult's working capacity (0.5 ha/year) is used, the risk of conversion all but disappears.

Hiring unskilled labour when FFL supply is exhausted is of course an option if land is plentiful. This however implies an approximate cost of 700 US\$ per man-year (respondent information). Using this and an average working capacity of 2.1 ha/adult and the per hectare income from crops makes farming by hired labour, indicates a theoretical surplus for four of the PES participants (P3, P5, P8, P10, P12), but with a modest *additional* profit (+5, +51, +30, +47 and +18 US\$/ha/year) compared to PES (30 US\$/ha/year), and at a considerably higher risk. For the remainder of the PES group this would generate losses. Using the minimum work capacity stated (0.5 ha/adult) would not allow any of the participants a net profit from farming with external, hired labour. In addition, access to capital is a constraint, as no credit institutions exist in El Castillo. This limits investments in land use conversion, which was by key informants estimated at 125-190 US\$/ha.

Respondents reported an average income from forest land of 5 US\$/ha/year. So on top of indicating poor additionality in the short term, the labour-related limits to agricultural expansion also indicates a significant participant benefit from enrolling forest land in the PES programme. The income from PES comes labour free and depending on the local labour market frees up time that could potentially be spent doing paid farm work on other local farms, if such work is to be had. The reported average from respondents indicated that approximately 50% of 'surplus' family labour had paid work on other farms in the area, making PES an all-else-being-equal entirely additive source of income.

Basic data	c4	c5	c10	c11	c12	c13	c14	c15	c16	c17	c18	c20
Farm area (ha)	49,3	42,3	31,7	16,2	25,4	25,4	32,4	33,8	42,3	25,4	21,1	22,5
Forest area (ha)	24.7	14.0	21.2	12.6	7.1	8.4	21.1	14.2	32.6	18.3	10.6	12.6
Min. land buffer (ha)	40.3	15.1	22.7	7.2	19.4	5.5	23.4	27.8	34.8	17.9	15.1	3.1
# full-time FF labourers	3	2	3	3	2	4	3	2	2,5	2,5	2	4
Livestock area (ha)	0	21.2	0	0	0	7.9	0	0	0	0	0	7.4
Max area cultivated (ha)	9	6	9	9	6	12	9	6	7.5	7.5	6	12
US\$ income/ha/year: crops	237	235	394	416	0	398	342	403	395	0	414	477
Net profit crops hired labour	-113	-115	44	66	-	48	-8	53	45	-	64	127
US\$ income/ha/year: cattle	-	38	-	0	0	72	0	-	-	0	-	0
Net profit cattle hired labour	-	10	-	-	-	44	-	-	-	-	-	-

Table 3. Basic household (HH) and land use data: drop-out members of control group

Turning the attention to the control group an overall similar pattern emerges: 3 of 12 matched control group respondents have a land surplus smaller than their forested area, meaning there is a potential risk of deforestation if all available FFL is to be exploited (using 3 ha/person/year). None of these overlaps persist if the minimum capacity of 0.5 ha/person/year is employed, though.

Using the average work capacity of 2.1 ha/person, seven selected control group respondents could still make a net profit from converting (ignoring conversion costs) forest to crop land despite using hired labour and one of these could even make a net profit from employing hired labour to rear cattle. It is only c20, though, which seems able to attain a profit significantly higher than the PES payments from doing so (127 US\$/ha/year compared to 30 US\$/ha/year). However, using the minimum capacity of 0.5 ha/person would not allow any to profitably cultivate crops by use of hired labour.

It obviously needs to be emphasized that although great care and much time have gone into data collection, they remain snapshots of an otherwise dynamic reality, where prices and productivity varies greatly, and they are best estimates of reality with some uncertainty attached.

Still, several factors could explain why households with apparent potential for profitable agriculture with hired help do not seem to exploit this option. Not least the fact that land use conversion is legally prohibited and does imply a cost. Both factors are partly reflected in land prices for forested and agricultural (cleared) land, the latter attaining upwards of three times the price per hectare of the former. Since both hiring of external labour as well as conversion of forest takes capital, which is in severely limited supply, it is a likely barrier for forest conversion. A majority of respondents state that they do use external labour, but the extent of this seems limited to peak periods such as harvesting and cases of emergency, where e.g. a household member is taken ill or worse. And while risk preferences have not been looked at in the present study they are a likely factor in explaining why those with potential for profitable farming do not engage in this, since wages have been relatively stable in the area for many years during which prices for agricultural output were reported to have varied with upwards of 100%. This would make investment in external labour a risky business, since only at the time of sale, after wages have been paid for a full crop cycle, would you be certain that it was a profitable investment. Against this, one must hold the reliability of PES modified by the trust in the buyer of said services.

7. Discussion

Looking at the history of El Castillo, it indeed demonstrates a large number of the conditions generally found detrimental to trust building in sociological, economic and political research mentioned in section 3.2. The sparse institutional presence seems to have been unable to prevent widespread illegal settlements and land grabbing schemes. Also, the possibility to legally acquire *de jure* ownership over lands without *de facto* land holders knowing of it, feeds a perception of legislation as worthless or favouring those with

more resources and connections. If infractions are discovered and culprits apprehended, testaments from the environmental public prosecutor, key informants and respondents indicate that few cases reach courts and even fewer result in convictions, validating expressed doubt about the enforcement and fair application of the law. This indicates poor and arbitrary enforcement of legislation. A similar pattern is reported by Gomez & Ravnborg (2006) for general crimes.

Additionally, the trustworthiness of public authorities has been undermined by examples of one government overruling the land titles issued by a former government. The fact that the two governments in question, the revolutionary Sandinistas and the post-revolution liberal government, represented fractions that had spent the better part of 25 years physically at war is part of the explanation. This indicates inconsistency in policy, and a willingness to undermine private property rights in a manner that links with political party interests rather than consistent and fair application of legislation. Examples of local public servants participating in illegalities (such as settlements in RBIM) serve to further weaken credibility of public authorities. Thus, the perception of legal regulations guaranteeing a safe minimum standard of compliance to expected behaviour of relative strangers is not predominant in El Castillo.

That large perceived difference in application of the law, depending on economic and political power, has a strong influence on local trust and social capital building is supported by e.g. Putnam (1993). So has the personal experience and history of misfortune and the perception of being part of a discriminated group (Hardin 1996; Alesina & Ferrara 2000; Levi 1998) and inequality (Molm et al. 2000; Nee and Sanders 2001; Labonne 2007; Bjørnskov 2006; Tsai et al. 2011). While the personal experience of respondent households was not investigated per se, the number of incidents reported and the number of persons and households involved (the largest single incident alone involving 500 persons) is large compared to the total population of El Castillo. Families are therefore not likely to be far removed from persons or households, which *have* actual adverse experience with tenure problems or criminal incidents, and may thus be perceived as more than just a theoretical risk.

Qualitative impressions, but no exact measure of the degree of difference within the rural communities, in terms of geographical origin of inhabitants, political orientation and income was secured during the study. It was, however, clear that no visible characteristics other than those related to social capital separated the PES group from its matched control group, the latter actively choosing not to participate in the PES scheme despite the offer and a documented economic gain from doing so. The explicit distrust expressed by the control group respondents by leaving the PES recruitment process, is a very direct expression of the lack of trust in FdR, despite FdR's 15 years of active pro-poor and pro-environment work in the Municipality and the fact that much of their staff is local. Interpersonal trust as an "imperfect substitute for government-backed property rights or contract enforcement where governments are unable or unwilling to provide them" (Knack and Keefer 1997) was thus not sufficient to assuage the doubts of the near-participants. As they still didn't sign the contract, despite the economic attractiveness of doing so, demonstrates a similar lack of trust in a legal back-up system providing *de facto* protection of legal land tenure, which could help them in case FdR really had been on a land grabbing mission. As a result both adoption rates and hence cost-effectiveness of PES recruitment was significantly and negatively affected.

Overall these findings add to the growing literature emphasizing institutional arrangements explicitly in the investigation of participation constraints and PES feasibility (e.g. Kosoy *et al.* 2008; Gong *et al.* 2010). This new direction in PES literature highlights the complex institutional, political and cultural settings as part of the empirical reality of PES, conforming poorly to clear cut theoretical assumptions and definitions of PES (as defined by e.g. Wunder 2005; Engel et al. 2008). This is echoed by several researchers (e.g. Muradian et al. 2010; Hecken & Bastiaensen 2010) appealing for a wider and more inclusive definition of PES reflecting the emerging realisation of dependencies between PES-like systems, their success and the contextual settings in which they are embedded (Vatn 2010).

If indeed the case study and initial bloom of research on dependence of PES on institutional setting are right, this re-poses the question from the introduction: might weak governance indeed be an indication of poor adoption rates for PES programmes instead of an indication of their appropriateness? Looking beyond the case study through the lens of the World Values Survey, we find that Nicaragua in 2009 scored in the lower 25% percentile when it came to government effectiveness, rule of law and control of corruption, and below 50% on *all* governance indicators (voice & accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption) (Kaufmann et al. 2010). Nevertheless, another six Latin American countries scored lower yet in 2009, when it came to rule of law (Kaufmann et al. 2010). This indicates a realistic risk of encountering similar trust-related problems in many of the countries typically targeted for potential PES interventions. Income inequality was not addressed specifically here, but given the reported impact on generalised trust by other studies, looking at the Gini coefficient for typical PES-targeted countries may also prove relevant as an indicator of PES odds. Nicaragua e.g. had a Gini coefficient of 0.52 in 2005 (World Bank, undated), placing it level with a large group of similarly poorly positioned developing countries. Even at more detailed levels quite a few similarities between a range of developing countries (their rural areas in particular) are suspected such as large income inequalities, widespread poverty, a turbulent history and weak governance. This would mean that levels of generalised trust might well be suspected to impede any large scale implementation of PES in many of the overall targeted regions. Moreover, in the absence of rule of law and generalised trust interpersonal trust becomes critical to get first-movers to sign on. This likely means a key role is held by both trusted organisations and potential participants with relatively high social capital, and even then growth of a scheme may only be slow as trust in the PES programme and the buyer/intermediary builds up by example.

8. Concluding remarks

The case study provides a good case for civil war, weak governance and inconsistent rule of law as elements, which have negatively influenced general trust; that trust was the single most important factor lowering PES recruitment, i.e. participation, to a third of what it could potentially have been, increasing transaction costs significantly in the process. Despite modest numbers, indications were likewise strong that farmers with higher social capital were comparatively more inclined to risk participation.

Considering the developing countries typically targeted by PES programmes relative to their standing on governance and inequality, there would be reason to consider trust a significant participation constraint in a number of Latin American countries, such as Bolivia, Guatemala, El Salvador and Honduras, as these are countries with high inequality and low scores, when it comes to governance. It would also suggest that although Costa Rica is a leader in PES implementation this may not be immediately transferable to neighbouring countries because of differences in governance quality.

The practical implications of trust being a major participation constraint includes increased transaction costs, revised recruitment strategies and careful consideration of the institutional set-up. The latter needs to take account of the perceived trustworthiness of the implementing agency, e.g. choosing intermediaries to maximise this. Budgeting and expectations of environmental impact need to prepare for slower and lower recruitment rates, *ceteris paribus*. The indicated importance of social capital may however point to a possible targeting criterion for getting first-movers on board when breaking new ground, both at a community and individual level. Exploring how to possibly utilize such social capital networks (kinship, neighbours) actively to promote adoption of PES programmes in areas of weak governance – without this being perceived as inequitable as well - may lead to new ways of overcoming trust-related barriers to cost-effective PES implementation under conditions of weak governance.

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Summary/key variables	PES		CON		t-test
	Average	Std	Average	Std	P(D<>0)
Farm size (ha)	88	128	33	18	83.4%
Household size (persons)	6.5	2.8	5	2.4	86.6%
Education level (weighted)	1.1	1.2	1.0	1.8	15.9%
Community accessibility (distance to key points)	88	73	94	44	19.3%
Forest area share	63%	20%	48%	23%	93.2%
Crop area share (all crops)	6%	4%	12%	13%	91.5%
Animal area share (all species)	16%	15%	16%	24%	1.2%
Fallow area share	15%	13%	24%	19%	86.7%
Income from farm work ex PES: US\$/year	543	621	686	682	44.9%
Income from work outside farm: US\$/year	1076	1738	972	1177	14.5%
Total income: US\$/year	3020	1717	2171	873	86.7%
Total income without PES: US\$/year	2387	1247	2171	873	39.9%
Total income/person: US\$/person/year	493	230	502	253	8.1%
Project participation (ex. PES experience): number	1.17	0.72	1.30	1.13	31.4%
Membership of local organisations: number	0.83	0.39	0.40	0.50	98.9%
Knowledge of environmental regulation: number	0.44	0.26	0.25	0.20	95.8%
Contact with authorities: number	1.17	0.94	0.30	0.57	99.3%

Table 1. PES and control group comparison (t-test)

PES group	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
Farm area (ha)	35.9	105.6	482.4	31.7	27.5	45.8	36.6	126.1	39.4	31.7	49.3	40.8
Forest area (ha)	33.0	21.1	410	15.2	11.3	28.4	22.7	76.9	30.3	17.8	32.5	33.9
Min. land buffer (ha)	19.5	37.6	445	24.2	16.0	29.2	20.0	95.7	22.3	14.7	35.9	24.5
PES area (ha)	28.2	9.9	28.2	15.1	11.3	28.2	11.3	20.4	28.2	14.1	28.2	28.2
No. of full-time FF labourers	5	4	6	2.5	1	3.5	2	5.5	4	4.5	3	3
Livestock area (ha)	1.4	56.0	19.3	0	8.5	5.0	10.6	13.9	5.1	3.5	4.4	5.7
Max ha cultivated (ha)	15	12	18	7.5	3	10.5	6	16.5	12	13.5	9	9
US\$ gross income/ha/year: crops	208	130	145	177	431	235	275	305	260	288	144	398
Profit crops w/hired labour	-142	-220	-205	-173	81	-115	-75	-45	-90	-62	-206	48
US\$ gross income/ha/year: cattle	57	22	63	0	24	0	11.5	88	32	105	37	0
Net profit cattle w/hired labour	29	-6	35	-	-4	-	-16.5	60	4	77	9	-

Table 2. Basic household (HH) and land use data: PES group

Basic data	c4	c5	c10	c11	c12	c13	c14	c15	c16	c17	c18	c20
Farm area (ha)	49,3	42,3	31,7	16,2	25,4	25,4	32,4	33,8	42,3	25,4	21,1	22,5
Forest area (ha)	24.7	14.0	21.2	12.6	7.1	8.4	21.1	14.2	32.6	18.3	10.6	12.6
Min. land buffer (ha)	40.3	15.1	22.7	7.2	19.4	5.5	23.4	27.8	34.8	17.9	15.1	3.1
# full-time FF labourers	3	2	3	3	2	4	3	2	2,5	2,5	2	4
Livestock area (ha)	0	21.2	0	0	0	7.9	0	0	0	0	0	7.4
Max area cultivated (ha)	9	6	9	9	6	12	9	6	7.5	7.5	6	12
US\$ income/ha/year: crops	237	235	394	416	0	398	342	403	395	0	414	477
Net profit crops hired labour	-113	-115	44	66	-	48	-8	53	45	-	64	127
US\$ income/ha/year: cattle	-	38	-	0	0	72	0	-	-	0	-	0
Net profit cattle hired labour	-	10	-	-	-	44	-	-	-	-	-	-

Table 3. Basic household (HH) and land use data: drop-out members of control group