DISCUSSION PAPER / 2010.04

Institutional Embeddedness of Local Willingness to Pay for Environmental Services:
Evidence From Matiguás, Nicaragua

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Comments on this Discussion Paper are invited.
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Abstract

The concept of Payments for Environmental Services (PES) has gained increasing popularity in the conservation literature as it offers the potential to reconcile opposing social and ecological objectives by paying land owners for the positive environmental externalities they generate on their land. Based on extensive fieldwork in Matiguás, Nicaragua, this paper aims to complement the literature on locally-financed PES schemes in agricultural watersheds. Using both qualitative and quantitative research approaches, it inquires into the under-researched demand-side potential by assessing local willingness to pay (WTP) for water and watershed services in an upstream-downstream setting. Our results show a significant WTP for improved water services and a clear local consciousness about upstream-downstream interdependencies, suggesting potential for a 'Coasean' water-related PES scheme. Contrary to expectations, the feasibility of such a locally-financed PES system is however undermined by prevailing local perceptions of agricultural externalities and entitlements, questioning the fairness of such payments. Also low levels of mutual trust seem to undermine the credibility of the PES framework. The viability and acceptance of locally-financed PES mechanisms will thus also depend on the prior social production of cognitive synergies and improved collective action.

Key words: Payments for Environmental Services (PES), watershed, willingness to pay (WTP), externalities, institutions, fairness

Abstrait

Le concept des Paiements pour les Services Environnementaux (PSE) gagne de plus en plus en popularité dans la littérature écologique, puisqu'il offre la possibilité de réconcilier des objectifs sociaux et écologiques opposés en rémunérant les propriétaires fonciers pour les externalités écologiques positives qu'ils génèrent sur leurs terres. Basé sur des études de terrain extensives réalisées à Matiguás au Nicaragua, ce travail contribue à l'analyse des programmes de PSE financés localement dans les bassins-versants agricoles. En adoptant une approche à la fois qualitative et quantitative, il complète la littérature existante en investiguant la demande potentielle pour ces programmes et en évaluant le montant que les habitants seraient prêts à payer pour un meilleur accès à l'eau potable. Nous observons une propension à payer (PAP) importante doublée d'une prise de conscience locale relative aux interdépendances amont-aval. Nos résultats montrent donc la pertinence de l'approche 'coasienne' des PSE dans le domaine de la fourniture d'eau. Néanmoins, la mise en place d'un tel système de PSE, financé localement, s'avère compromise par la perception locale des externalités agricoles et des droits de propriété foncière, suscitant des interrogations sur la légitimité de tels paiements. En outre, le déficit de confiance mutuelle nuit à la crédibilité des PSE. En conséquence, la viabilité et l'acceptabilité des PSE financés localement dépendront de l'existence préalable de synergies cognitives et d'une coordination sociale renforcée.

Mots-clés : Paiement pour les Services Environnementaux (PSE), bassin-versants, propension à payer (PAP), externalités, institutions, équité.

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1. Introduction

The main causes of environmental degradation are often conceptualized in economic terms, and more specifically as the production of negative environmental externalities in the form of unintended by-products of economic activities which are not accounted for in the market and therefore tend to be ignored in private decision making (Pagiola et al., 2002; Pearce, 1993; Pearce, 2004). As agricultural activities count among the main direct causes of tropical deforestation and biodiversity loss (Kaimowitz and Angelsen, 1998), while concurrently having the capacity to contribute to their reversal, increasing attention has been directed to farmers as potential protectors and providers instead of destroyers of both non-renewable and renewable natural resources (Hanley et al., 1998). This paradigm shift is increasingly reflected in global debates on climate change, such as 'Reducing Emissions from Deforestation and Forest Degradation' (REDD) (Harvey et al., 2010), and has led to growing research and implementation of mechanisms known as 'payments for environmental services' (PES), which explicitly focus on remunerating the production of positive environmental externalities (Engel et al., 2008; Pagiola et al., 2002; Wunder, 2005). As governmental regulatory approaches (often referred to as command-and-control measures) or more community-based integrated conservation and development projects (ICDPs) and educational approaches on their own have often proven to be ineffective in halting further degradation (Baland and Platteau, 1996; Ferraro, 2001; Pagiola et al., 2002, Wunder, 2005), PES could be a valuable complementary instrument in assuring more effective environmental governance (Engel et al., 2008). The premises of this innovative conservation approach are appealing, as it seems to offer a win-win situation for complex ecological and socio-economic problems.

The PES approach mainly banks on the metaphor of ecosystem stocks as providers of environmental or ecosystem services (ES), delivering huge benefits to society (Costanza et al., 1997; MA, 2005; Norgaard, 2010). The core idea is that private landowners, who in normal circumstances -i.e. in the absence of direct incentives- are poorly or not motivated to protect or reproduce natural resources on their land, will do so if they receive direct payments from ES buyers, which at least cover the landowners' opportunity costs of exploiting the land otherwise (Engel et al., 2008; Pagiola et al., 2002; Wunder, 2005). Rather than ineffective sanctioning of 'bad behaviour', PES argues that the beneficiaries of the positive externalities should pay for their provision by farmers. Although the original conceptualisation of PES recently has been the subject of criticism from various angles (see below), the dominant literature still builds upon Wunder's (2005: 3) definition of PES as a voluntary transaction where a well-defined ES is being 'bought' by an ES buyer from an ES provider if and only if the ES provider secures ES provision. These initial PES ideas reveal a predominantly Coasean conceptual basis, as it assumes that under low transaction costs and clearly-defined property rights problems of externalities can be overcome through private negotiation between affected parties (Coase, 1960; Engel et al., 2008).

Although most current pilot PES programs are (temporarily) financed by governments or communities (Vatn, 2010), it is important to note that Wunder's PES definition builds on a market-governance model, as it aims to change individual decision making by means of price incentives, allegedly avoiding impracticable prohibition and half-hearted motivational change (Kosoy and Corbera, 2010; Van Hecken and Bastiaensen, 2010a). McAfee and Shapiro

(2010) and McCarthy and Prudham (2004) associate this pro-market promotion with the rise of neoliberal discourse within supranational environmental policy-making institutions, which is matched by rhetorical marketing claims of the dominant PES literature that unattractive regulated nature conservation should be converted into alluring private business transactions (Bishop et al., 2009; Wunder and Vargas, 2005). Indeed, scarcity of public funds make some authors argue that the demand side of the market might be further developed in the future (Wunder et al., 2008: 851), thereby allowing society 'to give the invisible hand of free market economics a green thumb' (Wilson, 1993: 283, as cited by Pattanayak, 2004: 183).

Simultaneously it is recognised that in order to have a sustainable flow of ES, PES programs generally need ongoing, rather than finite payments[1] (Pagiola et al., 2002). As such, long-term funds must be encountered in order to turn current pilot projects into sustainable PES systems. One possible way is to focus on the potential of international payments for environmental services (IPES), whose main aim is 'to build compensation mechanisms for ES whose benefits are enjoyed by those far removed from the place that generates the services' (UNEP-IUCN, 2006, as cited in Huberman, 2009: 458). The main idea of IPES is to complement the currently limited ES market initiatives by 'a scaling-up of the core "upstream-downstream" PES model to fit into a "North-South" approach', mainly in the realm of biodiversity conservation (Huberman, 2009: 458) and climate change mitigation. Although this conceptual idea is gaining global momentum (manifested most clearly in the ongoing REDD negotiations under the United Nations Framework Convention on Climate Change), the perspectives of finding sustainable long-term funding for ES still look bleak, especially in the short run. Budget-constrained governments in developing countries allocate only very limited funds to natural resource protection. Initial global funding mechanisms, such as the Clean Development Mechanism (CDM), have also illustrated how difficult it is to realise IPES in practice, as they depend on limited funding, high transaction costs and strict rules and conditionality tied to funding (Farley et al., 2010; Krey, 2004; Thomas et al., 2010).

Therefore, expectations for sustainable 'fund-raising' in the context of PES are frequently focused on local sources of funding and thus local demand for ES[2] (Pagiola et al., 2007). Local user-financed mechanisms would be more efficient and sustainable than government-financed mechanisms[3] (Engel et al., 2008; Pagiola et al., 2007; Wunder et al., 2008), and would be less vulnerable to volatile national and international political conditions (Blackman and Woodward, 2010: 1627). This local focus naturally directs attention to watershed services (as opposed to carbon or biodiversity services), since these offer the clearest and most valued locally-perceived benefits. These contexts are believed to more easily fit the Coasean upstream-

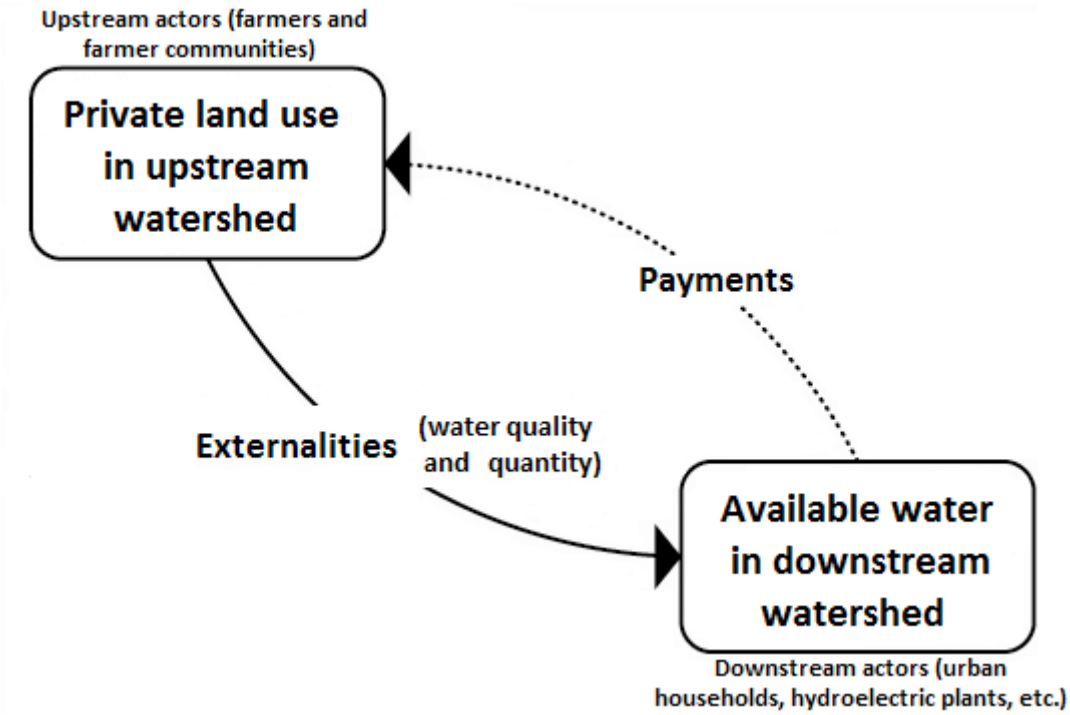
[1] It should be noted that there exist exceptions to this rule, especially if promoted land uses are privately profitable for the land user, as for example in the case of silvopastoral practices which generally enhance farm productivity in the longer term (Pagiola et al., 2007). It could be argued that in cases of privately profitable land use changes the use of (agri-)environmental education, credit instruments or one-shot payments could be a more efficient way of achieving the same objectives.

[2] In the prospect of the termination of a silvopastoral PES project in Matiguás-Río Blanco, Nicaragua (the same region as our case study) that focused on global ES provision, Pagiola et al. (2007), for example, suggested that potential long-term funding could be secured through the establishment of local markets for water services, which 'offer the most promising avenue for financing long-term PES programs' (ibidem: 383; see also Southgate and Wunder, 2009).

[3] Engel et al. (2008) argue that the line between government-financed and user-financed PES can be very thin. PES financed through compulsory local water user fees, for example, can be considered as government-financed, and not as user-financed, as the local water users make none of the decisions in this case. Nevertheless, the criterion we use in this article to distinguish different sorts of PES mechanisms is the spatial scope: are the conservation funds strictly captured from local communities (locally-financed) or at a non-local scale (globally-financed)?

downstream externality framework (see Figure 1 for a schematic overview). Indeed, Engel et al. (2008) note that upstream-downstream watershed scenarios usually reflect situations in which it is easy to identify the users of ES (water resources) and arrange for them to pay. Continuous and qualitative water provision to water users therefore 'constitutes a convenient lasting payment vehicle' and would allow other more global benefits such as biodiversity conservation to 'piggyback on these more marketable forest services' (Wunder and Wertz-Kanounnikoff, 2009: 585). In short, budget and transfer constraints often oblige PES implementers to focus on potential local funds, and therefore local demand (Pagiola et al., 2007). Hence, ongoing research is increasingly exploring the potential of local payments for watershed services, and its prospects in securing long-term ecosystem protection (Ferraro; 2009; George et al., 2009; Johnson and Baltodano, 2004; Kosoy et al., 2007; Muñoz-Piña et al., 2008; Ortega-Pacheco et al., 2009; Pagiola et al., 2002; Pagiola et al., 2010; Porras et al., 2008; Southgate and Wunder, 2009; Wunder and Albán, 2008).

Figure 1. Externalities and PES on a watershed level



Source: Own elaboration based on Porras, 2003

So far, however, few studies have explicitly focussed on demand-side aspects of locally-financed PES (Postel and Thompson, 2005). Johnson and Baltodano (2004) and Ortega-Pacheco et al. (2009) assessed local rural households' willingness to pay (WTP) for watershed PES in Nicaraguan and Costa Rican communities respectively, but both studies used small sample sizes, found quite diverging WTP results, and none of them explicitly dealt with broader institutional aspects. This paper attempts to fill this research gap by assessing local WTP for water and related hydrological PES schemes and by identifying and understanding the factors that determine this WTP. The empirical context of our study is the rural town of Matiguás in Nicaragua. As has already been argued from a supply-side perspective (Clements et al., 2010; Corbera et al., 2007a; Corbera et al., 2007b; Corbera et al., 2009; Van Hecken and Bastiaensen, 2010a), our demand-side analysis will show that the feasibility of PES programs is mediated and

constrained by context-related factors (such as property rights or entitlements) within the local socio-institutional context, a claim which is increasingly recognised among PES practitioners and scholars, but still under-researched in the PES literature up to now (Muradian et al., 2010; Vatn, 2010).

In the remainder of the paper, we first briefly introduce the study site and explain how we combined both qualitative and quantitative research approaches to assess the complex reality of environmental governance and the WTP of the local population for improved water delivery and watershed services (Section 2). Based on our qualitative research we then describe the socio-institutional context and the current approach to environmental governance in Matiguás (Section 3). Subsequently we analyse the local WTP for a watershed PES program in Matiguás with contingent valuation (CV) techniques (Section 4). The results of this exercise are then critically reassessed and discussed in a next section, mainly by contextualizing the result of the quantitative analysis within the local institutional background (Section 5). We end with some tentative conclusions.

2. Description of the study site and the applied methodologies

2.1. Study site

Our study site, the rural municipality of Matiguás, is located in the central Nicaraguan department of Matagalpa, at about 140 km northeast of the capital Managua. The municipality, which belongs to the so-called old agricultural frontier region (Maldidier and Marchetti, 1996), contains two protected areas: the Sierra Quirragua (from now on referred to as 'Quirragua') and about 30% of the Cerro Musún. It has an undulating terrain, with elevations in the Quirragua area of up to almost 1,400 metres above sea level. It knows a semi-humid tropical climate, with average temperature about 25-30°C and average annual rainfall 1,300-2,500 mm (Pagiola et al., 2007). The rainy season stretches from May to December. Besides the urban part of Matiguás, which lies at about 250 metres above sea level, the municipality exists of 26 districts and 88 communities, which cover a total area of 1,710 km². In 2005 the population of urban Matiguás was estimated at around 9,000, living in about 2,300 houses. The rest of the population, about 32,000 people, lives in the rural areas of Matiguás (INIDE, 2005). Despite the steady economic development during the last decades, the municipality is still part of a region with a high degree of poverty (ibid). Life expectancy is about 65.5 years, and –though some improvements have been made during the last few years- at 41.5% in 2005, the illiteracy rate is still one of the highest in Nicaragua[1] (INIDE, 2005; Levard et al., 2001).

Until the beginning of the 20th Century, the area predominantly consisted of forests. However, increasing colonisation of the area in search of pasture for cattle, both by peasants and landlords related to the Somoza government, resulted in rapid deforestation from the 1920s onwards (Maldidier and Marchetti, 1996). According to local estimations, during the last 20 years alone, more than 40% of the forested area in Matiguás has been cut down. Most of its soils naturally possess a low water infiltration capacity and intensifying agricultural land use has further lowered this capacity, resulting in rivers running dry during the dry season and in uncontrolled run-off and surface water increases during the rainy season. Inappropriate agricultural practices also pollute water sources with agrochemicals and organic contaminants. These activities have put increasing pressure on the drinking water supply in urban Matiguás, which currently depends on a system that captures water from the river Cusiles, which springs in the upstream natural reserve of Quirragua (northwest of urban Matiguás). Although the Quirragua area is a natural reserve, about 70% of its land is privately owned by farmers who mainly use the land for agricultural activities, such as the cultivation of corn, beans, and coffee, and pastures for cattle. The negative consequences of these upstream activities are locally perceived as an increasing threat to the downstream urban tap water supply, and a clear sign of the urgent need of more effective, negotiated environmental governance.

2.2. Research methodologies

The assessment of local WTP for watershed services and how potential PES programs fit into local institutional contexts are complex inquiries, which require a combination of several research approaches. In our research we opted for a mixed method approach, combining qualitative and quantitative techniques. The qualitative research, which assessed the institu-

[1] As shown below (table 1), our survey research elicited an urban illiteracy rate of 10%. Nevertheless, illiteracy rates are much higher outside the urban centre of Matiguás, which explains the higher regional rate.

tional setting, was carried out over six months during 2008 and 2009, and mainly consisted of in-depth responsive interviews (Rubin and Rubin, 2005). More than 25 representatives from different local institutions and organizations were interviewed (see annex I), ranging from consumer group representatives to central institution delegates and from political party secretaries to farmer cooperative presidents. The focus of the interviews was predominantly on the perceptions of environmental problems, their causes, and proposed solutions, as well as on agro-environmental externalities and the potential of PES schemes in dealing with these externalities. Additionally, several inter-institutional meetings dealing with environmental issues in Matiguás were attended. Some of the interviews were taped and verbally transcribed, but most of them were noted down during the interview sessions, as this created a more confidential environment. The data were analysed using the qualitative data analysis software NVivo[1].

In order to further investigate downstream households' WTP for improved water services, we complemented this research with the quantitative analysis of a split-sample CV survey in urban Matiguás. The CV method, in which people are asked hypothetical questions about how much a certain externality is worth to them, assesses the monetary value that respondents are willing to pay for changes in the provision of a (hitherto non-marketed) publicly provided good, such as most environmental services (Carson, 1999). This method is increasingly used in water supply research in developing countries (North and Griffin, 1993; Vásquez et al., 2009; Whittington et al., 1990). We use this method for 'valuing' water services as such while also linking it to specific policy scenarios, thereby generating information about their viability (Farley and Costanza, 2010: 2063). Prior to survey implementation we also conducted three focus group interviews, a pilot survey with a random sample of 32 households, and a number of iterations to incorporate feedback and assure respondents' understanding. In-person survey interviews were conducted during August 2009 using a geographically-stratified random sample of 1,015 households[2] (see annex II for a cadastral map of urban Matiguás), covering approximately 44% of total downstream urban households in Matiguás[3]. The surveys were implemented by ten (five female and five male) local university students, who received a four-day training before entering the field.

The final version of the survey elicited household responses on the current tap water system, water uses and consumption practices. Several questions were also aimed at eliciting households' perceptions on and attitudes towards local environmental degradation and entitlements, the existence of upstream-downstream externalities and preferred solutions for them. Subsequently, respondents were randomly read one out of four contingent water supply improvement scenarios (which were designed on the basis of the earlier qualitative research, see section 4.2), and were assigned an additional monthly water fee that also randomly varied across the sample. The referendum valuation question (Haab and McConnell, 1998), in which respondents had to answer whether they voted in favour or against the proposed scenario (dichotomous choice), was used to elicit the household's WTP in the presented contingent scenario. Finally, various follow-up questions were asked, which mainly focused on socio-demographic characteristics.

[1] Nvivo is a software package for qualitative researchers, which helps to manage, shape and make sense of rich text-based information, where deep levels of analysis on small or large volumes of data are required. It provides a workspace with tools that facilitate the coding, classifying, sorting and arranging of information.

[2] Sampling was based on random selection of plots on the latest urban cadastral maps, provided to us by the municipality and the water company (see also annex II).

[3] Such a large total sample size was required for the analysis of four spit-sampled contingent valuation scenarios (see section 4).

3. The institutional context of environmental governance in Matiguás

3.1. Environmental governance in Matiguás

Nicaragua has known a long tradition of centralized command-and-control natural resource management, in which the main emphasis has been on the creation of protected areas (Barahona, 2001; Ravnborg, 2010). The main actor responsible for environmental management at the national level is the Ministry of the Environment and Natural Resources (MARENA), which coordinates its tasks with the Ministry of Agriculture, Ranching and Forestry (MAGFOR), and the National Forestry Institute (INAFOR). However, the limited political willingness and capacity of these government agencies to effectively enforce the protected area decrees in the field has turned most conservation efforts into 'paper parks', where deforestation and natural degradation are steadily continuing. During the '90s the deforestation rate in Nicaragua amounted to about 117,000 hectares/year (FAO, 2003). The apparent failure of halting deforestation through this centralized top-down approach instigated a shift towards decentralisation. Especially after the creation of the 1988 Nicaraguan Municipalities Law and its 1997 reforms, environmental management was increasingly delegated to the municipal level, with municipalities taking up former central competences, though always in coordination with the afore-mentioned central institutions. Increasing local competences were, however, never accompanied by sufficient municipal budget increases, inhibiting municipalities to effectively take up these competences in practice (Larson, 2002).

Although the estimated deforestation rate has decreased somewhat during 2000-2005 (from a 1.6% annual deforestation increase in 1990-2000 to a 1.3% annual increase in 2000-2005) (FAO, 2006), the latest national forest inventory concluded that the current deforestation rate in Nicaragua still is above 55,000 ha/year, and it warns of an accelerated forest ecosystem degradation observed during the last few years (INIFOM, 2009). These numbers reflect how national and local governments have so far failed to halt environmental degradation in Nicaragua. Even though it has proven to be very ineffective for various reasons, Nicaragua still seems to stick to its traditional approach of restrictive top-down regulations. The most recent manifestations of this restrictive approach are the 2005 Law on Environmental Crimes (Ley de delitos ambientales) and the 2006 Law prohibiting the cutting, use, and commercialisation of forestry products (Ley de veda forestal). Both laws have created more severe punishments (fines and imprisonment) for environmental infractions. They also have complicated the administrative requirements for 'legal' use of trees, resulting in higher timber prices, increased illegal cutting and trafficking (mainly by powerful actors), and only very limited positive environmental results (Marín et al., 2007).

Our qualitative research confirms that Matiguás forms no exception to this general picture. Excessive reliance on poorly-enforced and inadequately-enforceable command-and-control measures has not succeeded in creating and even less in implementing an effective local framework for environmental protection. The presence of national government is very limited; the few local delegates of the environmental ministry, for example, do not dispose of any technical staff while also being responsible for several neighbouring municipalities. To make matters worse, the 'protected' Quirragua reserve does not possess any forest guards or police officers.

This lack of state presence makes environmental governance in Matiguás a de facto command-without-control approach, which leaves it mostly dependent on local non-state norms and practices.

The cultural perceptions on land and natural resources also influence how environmental governance is locally embedded, and how it interacts with both formal and informal institutions (Nygren and Rikoon, 2008). On the one hand, typical of peasant perceptions in areas such as Matiguás is that the entitlement to land is related to the –albeit nowadays imaginary- act of colonization: i.e. the conquering of the 'savage and unproductive' forest land in order to make it suitable for agricultural and cattle production. In this context, local farmer perceptions view the clearing of forest through hard labour as introducing 'mejoras' (improvements) which are the foundation of property rights and for which producers logically need to be compensated when their land is sold or expropriated, even when it belongs to a protected area (Bastiaensen et al., 2006: 15-16). At the same time, the agricultural frontier character implies that the region is an 'institutional barrier quite far from established country infrastructure … in which there is little state presence' (Baumeister and Fernandez, 2005: 80), and where extensive social networks, mutual trust, and security are often absent (Ravnborg, 2010).

On the other hand, even when Matiguás remains – in both a physical and a cultural sense – far removed from the urban society of the capital and the 'developed' world, ecological messages of endangered species, climate change and increasing pressure on water and forest resources have found their way to local cultural arenas, mainly through schools, radio and television and the discourse of some development organizations, in particular in the urban areas. At the same time the traditional top-down approach to environmental management in Nicaragua has created the general perception among rural and urban communities of environmental conservation as an almost militaristic engagement (see also Ravnborg, 2010). Narratives on environmental degradation are often linked to the 'malicious' and 'forest-destroying' farmers who should be disciplined by the use of permits and confiscation of chain saws, and by punishing them with fines or even imprisonment as if they were some kind of eco-terrorists. In a certain way the incapacity of the authorized institutions to effectively 'control' farmers has strengthened the narrative among urban dwellers that farmers have a bad 'moral and environmental consciousness' and that their 'economic selfishness' negatively affects the common good. The INAFOR delegate perfectly summarizes this common narrative by stating that 'Farmers are forests' biggest enemies, they perceive trees as a plague'.

This set-up is further compounded by political frictions that complicate coordination between central and local government institutions. As Nicaragua is characterised by a historical political divide (and previous armed struggle) between 'leftist' Sandinistas and 'rightist' liberals, cooperation and coordination between the liberal local government of Matiguás and the Sandinista ministries prove very difficult and result in very limited cooperation[1]. Furthermore, within each of the factions, vertical-authoritarian governance continues to prevail (Broegaard, 2009). Patron-client relationships, where only a few leading actors (patron-gatekeepers) mediate information and resource flows towards relatively isolated, dependent individuals (clients) and

[1] The establishment of so-called local People's Power Councils (CPCs), a –supposedly- apolitical structure of direct democracy that was called into life by the Sandinista government after its victory in 2007, is also seen as a further hindrance to efficient cooperation between local and central governments. Rather than promoting all-inclusive civil participation, it is widely perceived as an additional tool for top-down control of decision making at the local level (Cuadra and Ruiz, 2008).

thereby dominate and manipulate local collective action (or inaction), also dominate governance in Matiguás, and even more when we are dealing with more isolated, precariously accesible spaces like the Quirragua mountain area. All these conditions fuel mutual distrust, widespread opportunistic behaviour as well as the prevalence of double standards and deep-rooted pessimism about the possibility to break the negative, non-cooperative and non-rule abiding dynamics typical of vertical patron-client governance (Putnam et al., 1993). Urban dwellers' lack of faith in the potential of state governance mechanisms in restraining farmers from further environmental degradation was aptly articulated by the president of the local consumers defence organization:

> 'The [local and central] institutions never have contributed to guaranteeing the rights of the environment... Even in the urban centre, in broad day light, clearly visible to anyone, dairy farmers are washing their containers in the river. In the urban centre! And nobody does anything, not even the police, so just try to imagine how the situation is in the [upstream] communities!'

3.2. A shift towards alternative policy measures?

Despite the continued emphasis on failing command-and-control measures, the urgent need of effective environmental policies has also stimulated a few complementary initiatives with the aim of improving environmental conditions in Matiguás. The municipality, for example, recently issued a local regulation exempting land owners from property taxes on forested parts of their land, hoping that farmers would be motivated to leave the forested parts of their property untouched. In practice, however, this measure has had only very limited effects, mainly because property taxes on 'developed' land are already very low, and –due to a lack of control mechanisms- most farmers currently do not even pay property taxes on any land, forested or not. The high administrative barriers to apply for the tax exemption have so far further restricted the practical applicability of this measure.

Local authorities have also focused on reforestation projects, mainly by investing in a so-called vivero forestal (tree farm), in which trees are planted and developed in order to offer farmers the opportunity to buy seeds at low cost and reforest their farms. This initiative has also had very limited results. Indeed, the initiative has so far clearly failed to take into account the underlying drivers of deforestation, and has wrongly assumed that farmers do not reforest merely because they do not possess the resources to do so, neglecting the fact that reforestation or forested land use are mostly not interesting options for them, even if they are offered trees 'for free'. The former examples –though not classifiable as strict regulatory approaches- again show how local initiatives fail to induce any significant changes as they always revert to top-down approaches and fail to be part of a broader and coherent environmental policy, in which the perceptions and needs of the most important actors (i.e. the farmers), are also taken into account.

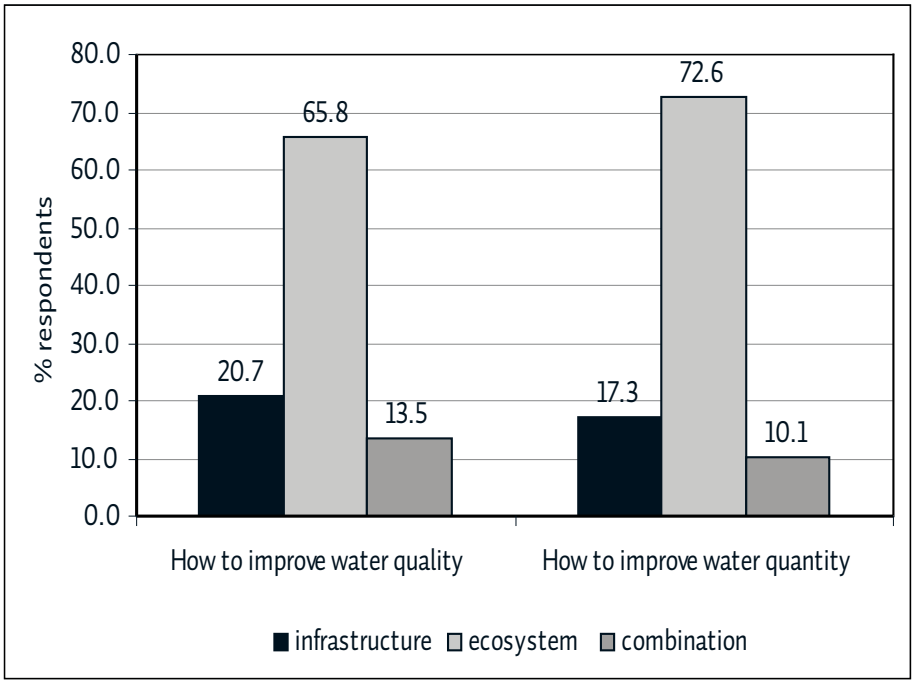
3.3. Failing environmental governance as a local momentum for PES?

If the emphasis on top-down regulations has so far failed to trigger effective environmental governance in Matiguás, at the same time, one of the most directly felt impacts of poor upstream environmental governance is the state of water resources in downstream urban Matiguás. The presence of 60 farmer households and their agricultural practices in the upstream

Quirragua area is locally considered to be the main threat to urban water supply by the residents of urban Matiguás. Our survey results showed that on average, households have about 14.2 hours of daily water connection during the dry season and about 3.8 hours of water connection during the rainy season, when heavy rainfall often results in inundations and sedimentation, obliging the water company to shut down the filtration and supply system. Households also perceive water quality problems; about 85% of households think tap water is polluted and almost 50% of households improve tap water before using it, mainly by adding chlorine or boiling it.

At the same time, more than 91% of respondents think Matiguás is struggling with deforestation problems, and about all respondents think that rivers in Matiguás are currently contaminated. The majority of respondents (67%) believe local water resources are badly protected, and about 70% think farmers are not protecting water resources on their farm. Our survey also elicited that 78% and 86% of downstream respondents consider that agricultural activities in the upstream area have negative effects on respectively water quantity and quality, and about 75% think that the negative effects of poor upstream watershed protection mainly affect urban dwellers. Furthermore, 87% and 85% of respondents affirm that reforestation of the upstream watershed would result in an increase of water quantity and quality respectively. Finally, Figure 2 shows that about 66%/73% of urban households think the best way to improve water quality/quantity in Matiguás is to invest in ecosystem protection, rather than in improvements of the existing water supply infrastructure (pipe system, tanks and filters). For the framing of the latter question –which was based on former qualitative research- we refer to annex III.

Figure 2. Preferred investments for solving water supply problems in urban Matiguás



It is exactly in this context of clearly perceived externalities from upstream activities, easily identifiable ES users, and failing regulatory policies that PES advocates advertise the idea of introducing direct incentives to upstream farmers in order to initiate or improve watershed management (Engel et al., 2008; Pagiola et al., 2002; Wunder, 2005). The idea of PES

is not completely new in Matiguás. The concept was first introduced in the region when one of the main GEF-World Bank funded PES pioneering projects in Latin America initiated its activities in several rural communities of Matiguás (Pagiola et al., 2007; Van Hecken and Bastiaensen, 2010a). The project started in 2002 and terminated in 2008, and was aimed at promoting silvopastoral practices in degraded pasture areas through payments for environmental services (generated by these practices) and technical assistance (Vaessen and Van Hecken, 2009). Farmers in the neighbouring Quirragua region, an area that was excluded from the project, have increasingly taken over the project narrative and even organized themselves by starting a local conservation foundation, whose main aim is to attract (international) funds to invest in ecosystem payments to Quirragua farmers. So far, however, the foundation has not succeeded in attracting any funds.

Although local government, NGOs and Quirragua farmer cooperatives are interested in implementing a local watershed PES scheme to solve water-related environmental problems, nothing guarantees however a priori that residents are willing to pay or contribute to the conservation bill. Complementary understanding of household preferences and the factors that influence their WTP may provide important inputs into the planning process and the possible role of PES transfer mechanisms.

4. Local WTP for improved watershed services

In this section we will investigate how much people in Matiguás are willing to pay in order to improve their water supply and how this could be linked with the necessary investments in infrastructure and/or ecosystem services, the latter through a PES system. We will analyse this by using split-sample CV scenarios, which allow us to compare WTP for ecosystem scenarios with infrastructural scenarios. Furthermore, through the statistical analysis we can further investigate which potential factors influence demand-side acceptance or rejection of locally-financed PES programs. First we will briefly present some basic socio-demographic characteristics of the sample households. Then we will explain the CV scenarios, and the empirical model that underlies the approach. Finally, we will present the main results of three model specifications.

4.1. Socio-demographic characteristics of respondents

The main socio-demographic data collected during the interviews are summarized in table 1. It shows that about 75% of respondents are female, which should not be much of a surprise because it is mainly women that stay at home during labour hours, when most of our interviews took place. The average respondent is about 39.5 years old, and has been living about 25 years in the urban part of Matiguás. The average education level is low, about 7 years, which corresponds to finishing the first grade of secondary school. Almost 10% of respondents are illiterate. Household size varies between 1 and 19 members, with an average of almost 5 members. On average, 1.8 household members are currently working, and the average reported aggregate monthly income of a household amounts to about 2,947 C$ (Nicaraguan Cordobas; at the time of fieldwork, August 2009, 1 US$ was equivalent to 20.5 C$), equivalent to approximately 144 US$. Only 22.7% of urban households reported to be involved in agricultural or cattle activities.

Table 1. Socio-demographic data respondents urban Matiguás

Continuous and interval variables

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Respondent's age (in years)	1015	39.47	14.06	15	95
Respondent's time living in Matiguás (in years)	1015	25.04	15.11	0.25	74
Respondent's level of education (in years)	1004	7.17	4.52	0	17
Total number of household members	1013	4.78	2.28	1	19
Total number of household members with job	1015	1.77	1.24	0	9
Aggregate household income (in C$/month)	886	2946.95	2788.85	0	>15000

Categorical variables

Variable	Obs.	Percentage
Respondent's sex is female	1012	75
Household owns house	1015	89
Respondent knows how to read and write	1015	90
Household involved in agricultural or cattle activities	1007	23

4.2. Contingent valuation scenarios

In order to assess WTP for specific water improvement policies, each respondent was randomly confronted with one out of four (two-by-two) contingent valuation scenarios (Table 2), for which the exact phrasing of all scenarios can be found in annex IV. Half of the respondents were presented a scenario in which the proposed project would improve water supply infrastructure (pipe system, tanks and filters), which would result in the supply of more and better water. The other half of the respondents were presented a scenario in which improvement of the water supply would be realised by transferring a monthly payment to upstream farmers in the Quirragua area, under the condition that the latter would not contaminate the river with fertilizers or pesticides, dead animals and animal excrements, and would stop cutting trees close to the river. In both infrastructure and PES scenarios, respondents were told that the project would lead to a situation in which they would have safe-to-drink tap water, without any interruptions. As decentralisation of public services provision and environmental management is high on the agenda in Nicaragua (Larson, 2002), the CV assessment also controlled for an intermediary[1]/administration variable. Half of the respondents in both scenarios were told that the improved water system would continue to be administered by the current departmental water company, while the other half was told that administration would be transferred to the municipality of Matiguás. Furthermore, all respondents were told that in order to finance the proposed project, every household would have to pay an additional monthly fee, which would be added to the current tap water bill. According to our survey results, the average monthly tap water bill amounts to about 115 C$[2]. The proposed additional fee randomly varied across sample households, ranging from 20 to 180 C$, with an interval of 20 C$[3]. Respondents were then asked whether they would vote in favour of or against the proposed project. Of the 1,015 households interviewed in urban Matiguás, 978 answered the CV question (see Table 2).

Table 2. Contingent valuation scenarios used in urban Matiguás surveys

		Type of improvement		
		Infrastructural improvement	**ES protection (PES)**	**TOTAL**
Type of administration	**Current water company**	n=240 Average fee=98.0	n=244 Average fee=100.2	**n=484** **Average fee=99.1**
	Municipality	n=249 Average fee=99.1	n=245 Average fee=100.7	**n=494** **Average fee=99.9**
	TOTAL	n=489 Average fee=98.6	n=489 Average fee=100.5	**n=978** **Average fee=99.5**

Note: Average fee presented to respondents is expressed in Nicaraguan C$ (1 US$ is equivalent to about 20.5 C$, as of August 2009). Total observations are based on households that answered the CV question (n=978).

[1] For the importance of intermediary organisations in PES mechanisms, see Pham et al., 2010.

[2] Nicaraguan Cordobas; at the time of fieldwork 1 US$ was equivalent to 20.5 C$.

[3] These amounts were established on the basis of the qualitative research and a survey pilot phase.

4.3. Model specifications

Following the standard CV approach it can be assumed that households will be willing to pay for improved water services up to the extent that this improvement compensates for the loss in benefits derived from such payment. One can further expect that WTP is a function of specific household's attributes and perceptions. In this study, the WTP function is assumed to follow a log-linear form:

$$LNWTP = X\beta + e \quad (1)$$

where LNWTP represents the natural logarithm of household's WTP for a change in water services. X is a vector of covariates including treatment variables (indicating different improvement and administration scenarios), household income, respondent's perceptions, and other relevant household characteristics. β is a vector of coefficients to be estimated, and e is the stochastic error term.

The referendum approach used in this study does not allow for direct observation of WTP. However, LNWTP can be indirectly identified given that respondents are expected to provide a favourable answer to the referendum voting question only if the household's WTP is greater than or equal to the fee presented in the contingent scenario. This is possible due to the equivalence between the probability of favourable responses and the probability that LNWTP is greater than or equal to the natural logarithm of the fee presented to respondents in the referendum question (LNFEE). That is:

$$P(Vote = Yes) = P(LNWTP > LNFEE) = P(X\beta+e > LNFEE) = P(e > LNFEE-X\beta) \quad (2)$$

On the assumption that the stochastic error term in equation 1 follows a logistic distribution, the error term in equation 1 can be scaled using a parameter K that is related to the standard deviation of the error term (i.e. $K = \sigma_e\sqrt{3}/\pi$) (Cameron, 1988). As a result, the following equivalence is obtained:

$$P(Vote=Yes) = P(e/K \geq LNFEE/K - X\beta/K) \quad (3)$$

Thus, when estimating logistic regressions based on the referendum voting responses, we observe that the estimated coefficient of LNFEE will be an estimate of 1/K. Similarly, the estimated coefficients of X are estimates of β/K. Therefore, the direct WTP parameters from equation 1 can be calculated by consecutively dividing the estimated coefficients of the independent variables by the estimated coefficient of LNFEE and by switching the sign of this resulting parameter.

Table 3 depicts the description and summary statistics of the variables used to estimate equation 1. The dependent regression variable VOTE has value one for respondents that voted in favour of the proposed scenario, and zero for those who voted against. LNFEE reflects the natural logarithm of the randomly assigned fee in the scenario, and is expected to have a negative coefficient, as a higher fee is assumed to lower the probability of approving the pro-

posed project (incentive compatibility). The covariate vector (i.e. X) includes the dummy variable ECO which indicates the two approaches to improve water services according to the split-sample design. The estimated coefficient is expected to be positive if respondents are willing to pay more for the PES scenario than for investments in infrastructure, and negative if the opposite is true. The dummy variable CITY indicates whether the improved water system would continue to be administered by the current departmental water company (CITY=0), or would be transferred to the municipality of Matiguás (CITY=1). The variable INCOME is also included and we expect tap water to be a normal good (i.e. $\beta_{INCOME} > 0$). Since an improved tap water system would increase the substitutability between tap and more expensive purified water, households that currently spend a higher amount of money on buying purified water (PUREBILL) are expected to report a higher WTP for both scenarios. Another household characteristic we included is the respondent's years of education (EDU). No specific hypothesis is made on the effect of this characteristic on WTP. Respondents who believe that the project is feasible in practice are expected to report a higher WTP (i.e. $\beta_{FEASIBLE} > 0$).

Table 3. Variables description and summary statistics for all observations

Variable	Description	Mean	Std. Dev.
VOTE	Respondent's vote in the CV scenario (1 = in favour; 0 = against)	0.55	0.50
LNFEE	Natural logarithm of the additional fee charged for water service improvement in the CV scenario	4.42	0.67
ECO	Respondent is presented the payments for ecosystem services scenario in the CV scenario (1 = PES scenario; 0 = infrastructure scenario)	0.50	0.50
CITY	Respondent is presented the decentralization scenario (transfer of water administration to municipality) (1 = municipality administration; 0 = current water company administration)	0.50	0.50
INCOME	Aggregate household income in C$/month	2946.95	2788.85
PUREBILL	Household's weekly expenditure on purified (bottled) water in C$	27.46	60.41
EDU	Education of respondent (in years of schooling)	7.17	4.52
FEASIBLE	Respondent thinks the proposed project could be implemented in Matiguás (1 = yes, 0 = no)	0.82	0.38
URBANEXT	Respondent thinks that mainly urban people of Matiguás will experience bad consequences of no environmental protection in upstream catchment (1 = yes; 0 = otherwise)	0.75	0.43
RIVERBAD	Respondent thinks that water resources in Matiguás are badly protected (1 = badly protected; 0 = otherwise)	0.67	0.47

In order to investigate possible relationships between respondents' perceptions of environmental externalities and their WTP, we included two additional variables. It could be expected that RIVERBAD, which has value one if the respondent thinks that water resources in Matiguás are currently poorly protected, has a positive coefficient in the ecosystem scenarios since the perception of poor protection would motivate the respondent to vote in favour of a PES project. The same reasoning applies to URBANEXT, which reflects the respondent's perception on which stakeholder group is highest affected by poor environmental protection. Respondents thinking that the most affected group are urban people like themselves can be expected to have a higher probability of voting in favour of the PES project.

4.4. Estimation results

Based on the split-sample approach, the regression results are analysed through the use of three models (see Table 4). Model 1 uses the pooled sample (all observations) and assesses whether there is a different WTP for infrastructure versus ecosystem (PES) scenarios. Models 2 and 3 only use the observations for respondents that were presented the infrastructure (ECO=0) and ecosystem (ECO=1) scenario respectively. They allow us to analyse the potential role that specific variables play in respondents' WTP for a specific policy scenario. Table 4 shows the results for the different models. The first column of every model displays the 'raw' logit results, while the second column displays the WTP parameters, obtained through the transformations explained above.

Table 4. Estimated WTP regression models for different specifications

	Model 1 Pooled scenarios (all observations)		**Model 2 Infrastructure scenario (ECO = 0)**		**Model 3 Ecosystem scenario (ECO = 1)**	
Variables	Regression coefficient	WTP parameter	Regression coefficient	WTP parameter	Regression coefficient	WTP parameter
LNFEE	-0.611 (0.128)***	---	-0.565 (0.186)***	---	-0.682 (0.181)***	---
ECO	-0.504 (0.163)***	-0.824 (0.314)***	---	---	---	---
CITY	-0.151 (0.163)	-0.248 (0.270)	-0.143 (0.240)	-0.253 (0.432)	-0.085 (0.227)	-0.125 (0.333)
INCOME	0.043 (0.036)	0.071 (0.060)	0.063 (0.057)	0.112 (0.106)	0.024 (0.046)	0.036 (0.069)
PUREBILL	0.006 (0.002)***	0.009 (0.003)***	0.008 (0.003)**	0.014 (0.007)**	0.004 (0.002)**	0.006 (0.004)*
EDU	0.011 (0.020)	0.019 (0.034)	0.003 (0.031)	0.006 (0.054)	0.020 (0.028)	0.029 (0.042)
FEASIBLE	2.007 (0.241)***	3.283 (0.767)***	2.362 (0.360)***	4.181 (1.472)***	1.690 (0.330)***	2.477 (0.797)***
URBANEXT	-0.135 (0.190)	-0.220 (0.316)	0.395 (0.278)	0.699 (0.545)	-0.604 (0.263)**	-0.886 (0.461)*
RIVERBAD	-0.255 (0.175)	-0.418 (0.301)	0.044 (0.257)	0.078 (0.452)	-0.559 (0.246)**	-0.820 (0.404)**
CONSTANT	1.561 (0.665)**	2.554 (0.708)***	0.376 (0.952)	0.666 (1.511)	2.199 (0.946)**	3.224 (0.787)***
Observations	751		377		374	
Log likelihood	-442.71		-209.47		-226.92	
Pseudo R2	0.137		0.158		0.124	
AIC	905.43		436.94		471.85	
BIC	951.64		472.33		507.16	

*Notes: ***, **, * imply significance at 1%, 5%, and 10% levels respectively; numbers in parentheses are corresponding standard errors.*

The estimated coefficients on LNFEE are negative and significant at the 1% level throughout all the models and confirm the incentive compatibility assumption (Carson and Groves, 2007). The estimated coefficient of ECO in the pooled data model is negative and highly significant, clearly indicating respondents' higher WTP in infrastructure scenarios. This result is unexpected, as we also found that the majority of respondents preferred investing in upstream ecosystem protection, rather than in infrastructural improvements (see section 3.3). We will discuss this important finding below. The estimated coefficients on CITY are negative in all models, but statistically insignificant. Apparently, households have no significantly different WTP for different administration levels. Similarly, household income seems to have no effect on WTP for improved water services. The coefficient of PUREBILL is positive and significant throughout the models, confirming our substitutability hypothesis. The estimated coefficients for EDU are positive, but never significant. Households that believe that the project implementation is feasible in Matiguás report a significant higher WTP in all models. This suggests that respondents who believe that the survey will have real policy consequences tend to report higher WTP (Herriges et al., 2010). Finally, we also find that the URBANEXT and RIVERBAD coefficients are insignificant in model 1 and 2. Nevertheless, and in contrast to our intuitive hypotheses, these coefficients are negative and significant in the ecosystem model. The estimated negative URBANEXT coefficient in model 3 is a clear indication that respondents perceiving themselves as most affected by poor upstream protection have a lower WTP for PES projects. Similarly, respondents who think water resources in Matiguás are at present poorly protected have a lower WTP for a PES project that would precisely improve watershed protection.[1] Again, we will discuss these counterintuitive results in the discussion section.

[1] Note how the WTP parameters can be interpreted as semi-elasticities of median WTP with respect to the associated variable (Southgate et al., 2009). A one-unit increase in the household's weekly expenditure on purified water in model 1, for example, increases median WTP with 0.9%. In this same model 1, the PES option of improving local water conditions decreases median WTP with almost 83%. Similar reasoning applies to all other WTP parameters.

5. Discussion

The CV exercise demonstrates that respondents express a higher WTP under an infrastructure improvement scenario than under a PES approach. This result is surprising especially since -as reported above- a large majority of urban residents identified the negative externalities of upstream agricultural activities and the lack of environmental governance to control them as the main reasons for their poor water services. They also (and logically) expressed a preference for upstream ecosystem protection over infrastructure improvements as a solution to their water problems. The results for model 3 confirm and deepen these puzzling results, as the WTP for water under a PES program is not higher, but lower among respondents that (i) are most aware of environmental externalities and (ii) perceive these externalities as mainly affecting the urban downstream population, to which respondents themselves belong.

In order to explain these seemingly incoherent choices, we believe it is necessary to qualify the assumptions underlying most CV studies. The CV method is often criticised for essentially methodological reasons, such as hypothetical and strategic bias[1] (Mitchell and Carson, 1989; Murphy and Stevens, 2004). But the method has also provoked critiques from a more epistemological point of view, mainly related to its underlying utilitarian train of thought and corresponding interpretation of the results. Various authors have emphasised that environmental or public values cannot be 'captured' on a model of individual preferences (Sagoff, 1988), and that the CV approach wrongly confuses values with preferences (Sagoff, 1988; Keat, 1997). Indeed, if we would apply the assumption of strict individual rationality and stable, independent preferences underlying individuals' decision making to our case in Matiguás, then standard CV theory prescribes that respondents should have a similar WTP under both scenarios, as the end product -i.e. the utility of consuming clean and regular tap water- is the same. Furthermore, in line with a Coasean negotiation approach, one would expect that urban residents' perception that environmental governance is more critical for the urban water provision would result in a higher WTP under the PES scenario. Yet, this is not the case.

As indicated by North (1990: 18-19) human motivation is more complex than a simple version of the neo-classical model of individual utility maximisation. It is based upon imperfect, subjective and partially collectively informed cognitive models as well as inherited social routines, which underlines the crucial role that institutions play in the choices that individuals make (see also Williamson, 1985). These general principles give us some way to explain the apparent inconsistencies of individual preferences that we observe in our WTP results. More importantly, they also allow us to link them with characteristics of the (not necessarily coherent and articulated) cultural repertoire of the local institutional environment that informs human perceptions and individual decision making (Vatn, 2009). In particular, we believe that framing effects, which occur because the CV scenarios get connected to particular discursive parts of that local repertoire, are of great importance here.

[1] A common problem in CV studies is the hypothetical nature of the survey, which may result in responses that are significantly greater than actual payments (Murphy and Stevens, 2004). Strategic bias occurs when a respondent feels that his or her response could actually influence a policy decision and therefore has a strategic incentive to not answer truthfully (Johnson and Baltodano, 2004).

The framing effect is not merely a matter of the wording and context of the survey questions (which is rightly of great concern in CV studies, see e.g. Schuman and Presser, 1981), but more importantly it refers to how the CV scenario is contextualised within the institutional background of local society, particularly when it introduces new rules and forms of transaction in the existing institutional framework (O'Neill, 1997). Therefore, to make sense of our CV findings, we attempt to assess our results against the local institutional background of narratives and practices in Matiguás. Our qualitative research findings offer two possible explanations for the observed results. The first is concerned with fairness considerations about the PES, indicating that prevailing urban ideas about farmers' entitlements reject the switch from a negative to a positive externality framework. The second complementary explanation is related to the lack of mutual trust and widespread opportunism under prevailing patron-client governance which tends to undermine the credibility of the transactions in the PES framework.

5.1. Externalities, entitlements and fairness

The PES approach has gained a lot of attention in policy circles as it breaks away from the perception of economic actors as perpetrators of negative externalities, and instead focuses on the potential positive services these actors could provide to society (Gómez-Baggethun et al., 2010; Pagiola et al., 2002; Wunder, 2005). Much of the dominant PES literature implicitly assumes that this 'externality switch' can be perceived as something 'natural', or at most as a mere technicality, and therefore little further attention is dedicated to the implications of this assumption (Salzman, 2005; Van Hecken and Bastiaensen, 2010b; Vatn, 2010). The categorisation of externalities is, however, not a mere technical issue (Vatn and Bromley, 1997). In line with Salzman (2005: 960) we believe it 'turns less on biophysical measures or ecological modelling than on [society's] sense of what the allocation and definition of entitlements ought to look like and how they should change over time'. In other words, in order to understand and assess the possibilities of new policy instruments and their potential embeddedness in the local socio-institutional context, it is important to explore society's perceptions of entitlements.

In section 3 we already discussed how environmental governance in Matiguás has been mainly limited to top-down regulatory approaches, which depart from the perspective that farmers should be 'disciplined' in taking care of the environment. An implicit but very present assumption of this approach is the consideration of farmers as producers of negative externalities. Most urban dwellers perceive farmers' practices as 'harming nature' with negative consequences for society and due to the context of ineffective and unjust rule enforcement, they think that –as one respondent aptly expressed- 'farmers have gone unpunished for their depredation of natural resources for too long'. This message has been further institutionalized through the global ecological discourse on connections between deforestation and climate change, which have progressively entered the local cultural arena. As explained by the presenter of a local environmental program, local media outlets, such as the radio have played a key role in reinforcing these discourses:

> 'In my program I always dealt with several topics, such as deforestation, agricultural fires, dumping of garbage in rivers, contamination of rivers, etc. People started to call and denounce illegal practices on the radio… I informed the population with the law in hand. Those who didn't know the law finally got to know it and some farmers started to detain illegal activities because they got scared for the legal and social consequences of their actions.'

The sudden introduction of a new mechanism that largely contradicts these dominant perceptions generates a new and hitherto unfamiliar framework of reference. Instead of obliging farmers to protect water resources on their property (a preferred solution by 98% of survey respondents) and fining farmers for bad environmental custody (preferred by 96.8% of respondents), urban households would now be obliged to compensate farmers for refraining from 'bad' land use practices. This change results in reluctance among respondents to pay farmers for the ES that they could provide, as farmers are precisely expected to take measures against harm. The proposed paradigm shift would implicitly allow farmers to demand compensations for actions they are deemed to undertake as responsible caretakers, and thereby implicitly presumes an unrestricted private property right over land and resources of the individual owners. This claim is however not self-evident as property rights will typically be restricted by a number of state and non-state rules of entitlements (Merlet, 2007). The majority of urban households (66% of respondents), indeed believes that farmers have a limited entitlement over privately-owned land, restraining them from exercising whatever activity they want on their property.

This is compatible with the CV results which demonstrate that –though both infrastructure and ecosystem scenarios imply the flow of financial resources out of the respondents' pockets to other actors- households clearly prefer the additional fee going to infrastructure investments, although they previously stated they deem investments in upstream ecosystems as more urgent (section 3.3). In other words, they attach a negative premium to rewarding the destroyers of natural resources for their destruction. The same reasoning applies to the negative coefficient of RIVERBAD in the PES scenarios. It reflects that it is precisely downstream households that are most aware of farmers' production of negative externalities who are least eager to reward farmers for the conservation actions that they are deemed to undertake out of moral and social duty. One explanation is that they perceive this as unfair. One urban dweller stated to consider it 'unfair asking us to pay farmers for taking care of their property, as in fact, they are already legally obliged to do this', and other respondents expressed that they 'don't care paying more for tap water, as long as the money does not go to the [Quirragua] farmers'. This is also reflected by the negative sign of the URBANEXT coefficient, indicating that respondents who perceive they are the main stakeholders affected by poor upstream protection are precisely more reluctant to pay upstream farmers.

In short, the idea of paying farmers for avoiding environmental degradation seems incompatible with at least part of the local discursive repertoire which has mainly focused on one-sided obligations for farmers, with only very limited emphasis on broader societal responsibilities. Moreover, the physical distance and the absence of any significant negotiation spaces has led to a situation in which most upstream-downstream interactions from the upstream side are 'monopolised' by only a handful of absentee landowners, living in the urban centre, but possessing large amounts of land in the Quirragua area[1]. These better-off farmers are generally the (only) ones that are attending meetings in representation of the interests of all Quirragua farmers, and the ones that act as the gatekeepers for upstream communities and thereby further distort the general perception that downstream people have of upstream farmers. One respond-

[1] Obviously, the upstream-downstream spatial 'divide' that we often refer to in this paper, does not imply a strict social division, as social networks are complex and stretch much further than a simple spatial division between the urban downstream centre and the rural upstream communities (Ravnborg and Westermann, 2002). However, as a manifestation of the prevalence of vertical patron-client governance structures mentioned before the main 'channels' of social interaction and communication between upstream and downstream actors are to a very large extent limited to a few social gatekeepers.

ent expressed a disenchantment with 'how the lives of ten thousand people in the urban centre are disturbed by only three farmers up there', and another further specified his indignation by stating that he is 'not prepared to pay these rich farmers who on top of that are themselves living and drinking tap water in urban Matiguás'. Sommerville et al. (2010: 1263) argue that 'perceptions of unfairness can undermine the effectiveness of incentives that provide apparent net benefits ... at the individual scale [and] can have a substantial impact on the participation of the wider community and thus the efficacy of an intervention'. Game theoretical experiments have also shown that parties often prefer no deal to a deal they think is unfair, even if the deal would leave them better off (Oosterbeek et al., 2004, as cited by Markandya, 2009: 1147). The evidence of our case indeed suggests that in Matiguás ideas and emotions about the unfairness of PES, even when offering clear win-win perspectives, is nevertheless rejected by part of the urban population.

5.2. Trust and credibility of the PES framework

The lack of any representative and multi-stranded upstream-downstream consultation platform where different stakeholders are able to analyze, discuss and negotiate different interests and perspectives of perceived natural resource problems and agree on action strategies (Ravnborg and Guerrero, 1999: 264) has resulted in very limited cooperation between upstream and downstream actors. The mainly negative messages regarding upstream farmers emanate both from the existing restrictive regulatory framework as from the way this framework is locally interpreted and translated to dominant discourses in downstream Matiguás. On the other hand, and from the upstream perspective, farmers feel they are mainly marginalized by broader society, carrying a burden of high expectations, without receiving any support or acknowledgement for the activities they are deemed to exercise or to abstain from. This upstream perspective is summarized as follows by one of the upstream farmers:

> 'We farmers are not stupid. They [people in urban Matiguás] are telling us we should take care of the river, but what do we get in return? We're not the ones drinking water in Matiguás, but we are supposed to take care of the rivers, so what are you going to offer us in return? ... It is a question of giving and taking, but in our case we're only supposed to give. We're sick of promises and promises, the municipality always promises to invest in roads, they were going to build a bridge, but nothing ever happens. So what are we supposed to do?'

Typical in regions such as Matiguás is indeed that the municipal budget is almost entirely invested in urban areas, often resulting in very few resources flowing to rural communities (Larson, 2002), precisely because they are often under-represented in policy-making.

Upstream farmers and downstream urban dwellers are apparently 'trapped' in a collective action problem with a socially-suboptimal Nash equilibrium as they do not manage to overcome the stalemate of individual non-cooperative strategies despite clear opportunities for win-win scenarios (Ostrom, 1990; Ostrom et al., 1994). In particular, the above-mentioned governance deficiencies of inherited patron-client structures, leading to pervasive mutual distrust and widespread opportunism as well as the tensions concerning the fairness of transactions with richer patron-actors, undermine the credibility of the PES framework. Many urban respondents simply do not believe that it will be possible to implement and effectively enforce the conditionality of the payments. Statements such as 'Why would farmers suddenly start pro-

tecting the environment, if in the past 20 years they never have done so?' or 'How can we be sure that our money will really go to environmental improvements?' clearly reflect the worries of urban dwellers. In this context it is not surprising that urban dwellers rather prefer paying for infrastructural improvement, possibly coupled with renewed and intensified efforts at government control of the upstream area, instead of paying farmers for an insecure or even quite improbable outcome.

At the same time, we should bear in mind that conservation success is not only dependent on providing tangible and individual benefits to individual farmers, but is mainly 'contingent on developing positive local attitudes' (Struhsaker et al., 2005, as cited by Sommerville et al., 2010: 1263). But a more important and first step in developing these positive local attitudes in Matiguás should be centred on breaking the existent negative vicious circle of distrust, through the promotion of processes that facilitate the creation of multi-stranded platforms for negotiating and coordinating collective action between upstream and downstream (institutional) actors. The importance of these platforms and the factors that facilitate or restrict collective action have been the subject of extensive inquiry during the last two decades, especially after Ostrom's ground-breaking work on governing the commons (Ostrom, 1990). One of the main lessons from this research is that actors' resource management is not only 'determined by external structural forces such as the market or the state ... Rather, it is shaped by the interplay between such factors and relationships, and individual [actors'] own experiences and perceptions' (Ravnborg and Westermann, 2002: 43). Development of trust through social interaction would also increase the level of social control, an element which is extremely important in contexts of limited governmental presence. The main initial role of external interventions and organizations should then be focused on facilitating the creation of such interaction spaces that enable processes of perceptual changes related to entitlements and (shared) responsibilities, and therefore the legitimacy of practices vested in socially embedded institutions (Cleaver, 2002; Ravnborg and Westermann, 2002)[1].

[1] In the Nicaraguan context, some possibilities might be offered by the so-called 'Community drinking water and sanitation committees' (CAPS by its Spanish acronym), which are formally elected and recognized local platforms for local, participative water management and which recently gained some, albeit not necessarily completely adequate, legal recognition (Kreimann, 2010). More research is needed, however, to evaluate whether, how and under what conditions such formalized forums are the right way to proceed in order to strengthen local governance by building cognitive synergies and multi-stranded, horizontal and vertical accountable governance. In this, we should not forget that most of present-day governance operates through non-formal (horizontal and vertical) mechanisms which will inevitably articulate to the formal procedures in what Cleaver (2002) called a process of institutional bricolage.

6. Conclusion

Our empirical evidence suggests that a Coasean approach to PES, in which society would come to an optimal allocation of positive and (avoided) negative externalities through negotiation in a market-based framework, could prove difficult to apply in practice. Apparently, the mere existence of clearly-defined externalities, which is often seen as one of the main necessary conditions for the creation of PES or PES-like compensation mechanisms (Engel et al., 2008; Pagiola and Platais, 2007), does not out of itself offer sufficient potential to solve current water problems in Matiguás. Our research shows how a Coasean framework to PES falls short of capturing a number of essential issues and processes at the local level, and offers a potential explanation for respondents' relatively low WTP in other studies on local demand for watershed services (e.g., Johnson and Baltodano, 2004). Our puzzling CV results and our complementary qualitative research findings indicate that WTP is not just a matter of individual consumption of better and more steadily available water, but that WTP is inextricably connected to perceptions about the underlying problems and responsibilities, and therefore inseparable from context-related socio-political factors that are embedded in the local institutional framework (see also Corbera et al., 2007b). Not only do different actors assess externalities and the underlying entitlements (and perceived fairness) in a different way, but also and perhaps even more importantly, the absence of mutual trust between different 'parties' involved in a possible transaction undermines the foundation of market-based tools, as the latter are social constructs that precisely depend on a minimum level of trust (Cleaver, 2002; Kosoy and Corbera, 2010). Therefore, demand-side studies on the feasibility of (locally-financed) PES mechanisms should not be restricted to mere CV or cost-benefit assessments, but should also encompass broader inquiries into their interactions of 'demand' (and for that matter also 'supply) with local social practices and associated discourses (so-called deliberative appraisal methods, see Vatn, 2009). We need to be aware that each particular ES-market will need to be socially and culturally created and sustained. Obviously our study only hinted at some of the socio-political interactions involved. Additional studies should help to further clarify this important link and generate insights on how appropriate institutional conditions for viable PES systems could be crafted through processes of 'institutional bricolage' (Cleaver, 2002) from within and in relation to the existing repertoires. Insights from political ecology, for example, might offer very useful insights on how cultural 'meanings attached to the environment shape the range of conservation efforts', and 'how efforts targeted at environmental conservation are intrinsically interwoven with questions of power and political authority' (Nygren and Rikoon, 2008: 775).

The conclusion that a PES system requires adequate institutional embeddedness also prompts us to warn against an overenthusiastic promotion and adoption of PES as a 'market-based' alternative to deficient regulatory, ICDP, or other community-based natural resource management approaches, even if all the necessary implementation conditions that Coasean PES theory prescribes are met (Pagiola, 2005; Wunder, 2005; Wunder, 2008). This is not to say that PES should be discarded as a whole. We think it can play an important complementary role in conservation policies, but in order to achieve its potential it should be broadened to an expanded institutional governance approach to PES (Corbera et al., 2009; Muradian et al., 2010). Rather than promoting PES as a tool that would correct the inefficient outcomes of regulatory or development-based approaches, the latter perspective explicitly considers PES as part of an integrated rural governance strategy (Muradian et al., 2010), which takes into account

the cognitive-motivational dimensions as well as the social and political relations that shape natural resources management (Ravnborg, 2003). Economic transactions such as PES, could thus eventually take up a complementary role along the way, but should be carefully embedded in the broader institutional context, as they precisely depend on the preliminary development of a 'solid' social foundation and 'the social trust on which institutions depend' (Cleaver, 2002: 27). Vatn (2005: 215) perfectly recapitulates the previous discussion by emphasising that 'choosing policy instruments is thus not simply about changing incentives. First of all it is about instituting certain logics, about understanding which institutional frames people apply, and about influencing these frames.'

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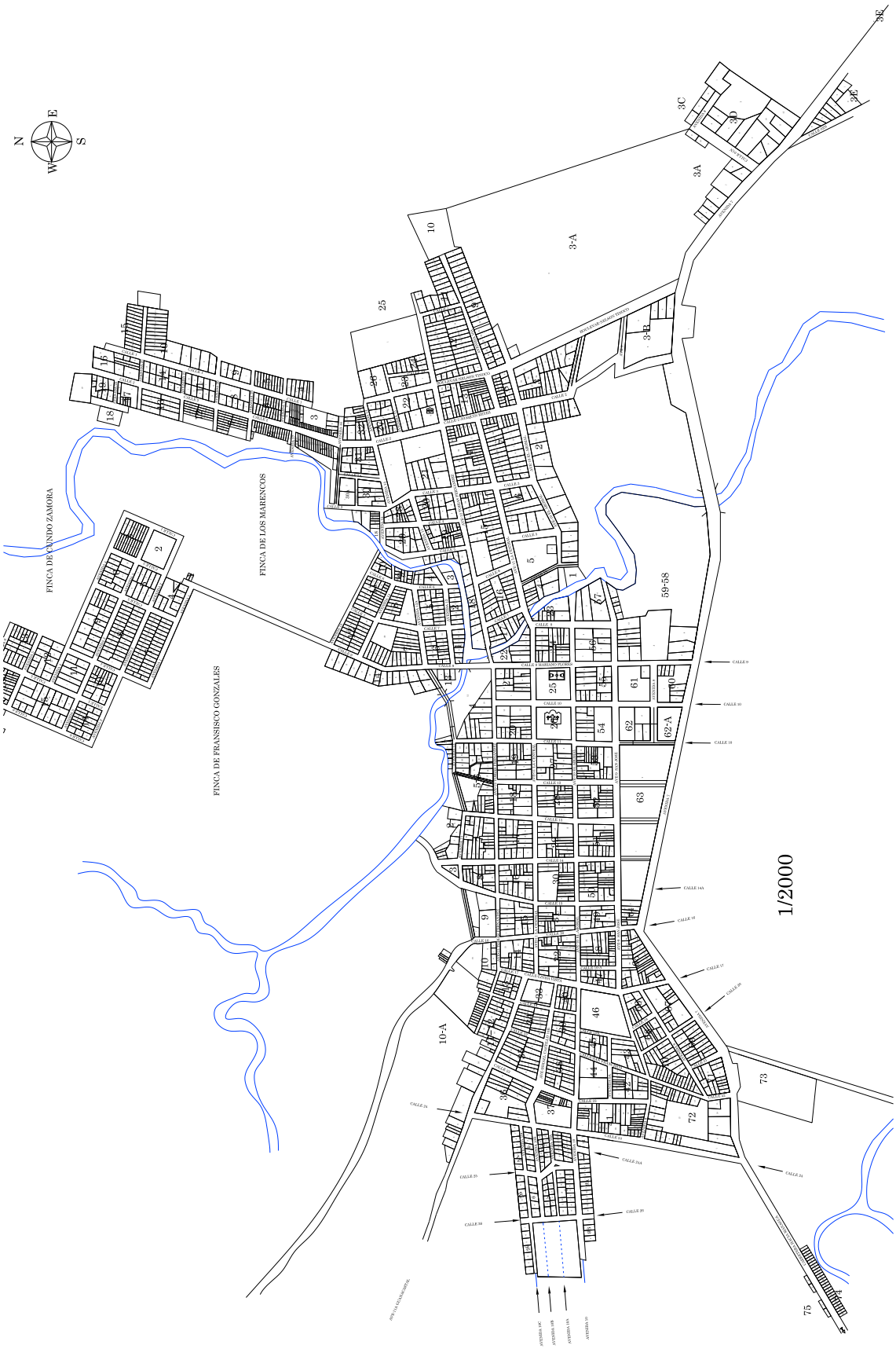
ANNEX I:
List of interviewed participants and attended meetings (qualitative research)

(We omitted the names of the participants to maintain confidentiality)

Interview/meeting date	Institution/organisation/function
Various occasions between 02/03/2009 and 17/08/2009	Responsible for environmental management in the Municipality of Matiguás
Various occasions between 14/03/2009 and 21/08/2010	Quirragua coffee farmer; President Quirragua farmers' cooperative; Co-founder and member of the Quirragua conservation foundation
Various occasions between 16/03/2009 and 17/08/2009	Various urban dwellers Matiguás (n = 23)
24/03/2009; 02/04/2009	Co-responsible water company (AMAT) Matiguás
24/03/2009; 01/04/2009	Responsible community electricity and water projects in the Municipality of Matiguás
24/03/2009	Municipal council member Sandinista Party (FSLN); member of municipal environmental commission
25/03/2009	Executive Secretary Sandinista Party (FSLN) Matiguás
25/03/2009; 17/04/2009	President consumers defence organization Matiguás (CENIDH)
25/03/2009	Municipal Forestation Commission (COMUFOR): Inter-institutional Meeting
25/03/2009	Mayor Matiguás (Liberal Party PLC)
25/03/2009	Public prosecutor environmental crimes
26/03/2009	Local delegate Ministry of Health (MINSA) Matiguás
26/03/2009; 27/03/2009; 21/04/2009	Municipal council member Liberal Party (PLC); ex-vice mayor Matiguás
26/03/2009; 03/04/2009	Quirragua cattle farmer; Co-founder and secretary Quirragua conservation foundation
27/03/2009	Local delegate of Ministry of Agriculture, Ranching and Forestry (MAGFOR) Matiguás
31/03/2009	Responsible water company (AMAT) Matiguás
31/03/2009; 04/04/2009	Radio journalist Matiguás (presenter radio program 'Protection and conservation of the environment'); Teacher local secondary school
01/04/2009	People's Power Councils Meeting (CPC and GPC): Inter-institutional Meeting
01/04/2009	Local delegate Ministry of Environment and Natural Resources (MARENA)
01/04/2009	Local delegate National Forestry Institute (INAFOR)
01/04/2009	President consumers defence organization Matiguás (CPDH)
02/04/2009	Commandant fire department Matiguás
02/04/2009	Police chief Matiguás

ANNEX II:
Cadastral map of urban Matiguás, used for geographical random sampling



ANNEX III:
Survey questions on preferences for infrastructure or ecosystem investments

In your opinion, what would be the best way to improve the drinking water quality in Matiguás? Investing in improvements of the installations and water equipment of the current water system, or investing in improving the protection of the water resources in the [upstream] area of the river Cusiles and the Quirragua zone?

In your opinion, what would be the best way to improve the drinking water quantity in Matiguás? Investing in improvements of the installations and water equipment of the current water system, or investing in improving the protection of the water resources in the [upstream] area of the river Cusiles and the Quirragua zone?

ANNEX IV:
Phrasing of Contingent Valuation scenarios

Keep in mind that the current water service in Matiguás is frequently interrupted and that water is sometimes unsafe to drink. Suppose that the Matiguás residents would have the opportunity to vote in favour of or against a project that would improve the current tap water service.

Scenarios A and B: Infrastructure investments
The project would consist of replacing the current pumps, tanks, pipes, filters, and purification system with more advanced technology to collect and treat water from the river Cusiles. The new system would collect more water, and would treat the water in order to reduce the levels of chemicals and residuals from farmers and farmer communities upstream. Therefore, with the new system, you will have tap water that would be totally safe to drink and with good pressure 24 hours per day, every day of the year, and without any interruptions.

> ***Scenario A (administration at departmental level):*** The new system would be administered by the current Water Utility of Matagalpa.
> ***Scenario B (administration at municipal level):*** Furthermore, as part of the project, the water service administration would be transferred to the municipality by creating a municipal water utility to be administered by the municipality of Matiguás, which would locally manage the water system.

Scenario C and D: Ecosystem investments (PES)
The project would consist of establishing a fund which would pay a monthly amount of money to the farmers and farmer communities in the upstream area of the river Cusiles and Quirragua, in order and under the condition that these farmers would refrain from polluting the river with garbage, washing of clothes, human and animal excrements, fertilizers and pesticides, and would not deforest the river banks. The project would increase the water quantity in the river Cusiles and would reduce the amount of chemicals and pollution that these upstream farmers currently discharge. Therefore, with the new system, you will have tap water that would be totally safe to drink and with good pressure 24 hours per day, every day of the year, and without any interruptions.

> ***Scenario C (administration at departmental level):*** The project and the payments to the farmers would be administered by the current water company as part of the tap water service.
> ***Scenario D (administration at municipal level):*** Furthermore, as part of the project, the water service administration would be transferred to the municipality by creating a municipal water utility to be administered by the municipality of Matiguás, which would locally manage the water system and the payments to the farmers and the farmer communities.

However, this project would cost money. In order to finance the project, it would be necessary to increase the water bill of all water users in Matiguás. Your water bill would increase by an amount of C$ FEE per month, in addition to what you currently pay. Keep in mind that the increment of C$ FEE per month that you would pay for the improved water service will not be available to purchase other things such as food, clothes and other items needed in your household. Would you vote in favour of or against the project?

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