THE EFFECTS ON VALUES, BELIEFS AND NORMS OF PAYMENTS FOR ENVIRONMENTAL SERVICES: EVIDENCE FROM A PES PROGRAM IN COLOMBIA

By

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ABSTRACT

THE EFFECTS ON VALUES, BELIEFS AND NORMS OF PAYMENTS FOR ENVIRONMENTAL SERVICES: EVIDENCE FROM A PES PROGRAM IN COLOMBIA

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Payment for Environmental Services (PES) are economic incentives seeking to promote conservation outcomes. PES is being widely used around the globe, however, questions regarding their effectiveness in protecting natural resources and their behavioral effects on those receiving the payments are still debated in scholarly circles.

Ganaderia Colombiana Sostenible (GCS) is a program seeking to incentivize cattle ranchers to pursue sustainable practices, particularly silvopastoral systems, in order to protect biodiversity in rural communities in five areas of Colombia. They are doing so by providing technical assistance to ranchers within their areas of interest and by implementing a PES scheme in regions of particular interest for biodiversity conservation. Our research was conducted in one of these regions with three different rancher groups: a group receiving PES and technical assistance, a group receiving technical assistance but no PES; and a control group receiving neither PES nor technical assistance. In this research we investigated a) the challenges of implementing a PES program and b) how the payments from the program might affect the values, beliefs and norms of the ranchers receiving the payments. We found that transaction costs and monitoring were crucial factors in the implementation of these programs. In addition, we found significant differences in the values, beliefs and norms among the ranchers receiving PES compared to the other two groups.

The differences in the values, beliefs and norms across the three groups raise crucial questions to be investigated further, such as whether the PES program is creating these differences, or if ranchers with these characteristics are self-selecting to join the program.

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INTRODUCTION

Governments, communities and environmental organizations pursue environmental sustainability through different conservation policies and instruments that protect environmental services. In the process of understanding the services that the environment provides the Millenium Ecosystem Assessment classified ecosystem services into the following categories: supporting services, regulating services, provisioning services and cultural services (Daily GC, 1997 in Millenium Ecosystem Assesment, 2005). A wetland provides services that may fit in more than one of those categories; for example, it provides water filtration and retention to maintain the health of rivers and streams, which delivers provision and regulating services. Wetlands also keep the soil from eroding, which offers a supporting service; and finally wetlands can also provide a sense of place, which offers cultural services.

According to the Millenium Ecosystem Assessment (2005) "[…]over the past 50 years, there have […] been substantial changes in some of the regulating, cultural, and supporting services that ecosystems provide." Given the environmental crisis that is threatening human well-being, the ecosystem services approach is crucial to find different conservation policies and instruments that may modify, if not reverse, the damaging path of destruction so that we can maintain both human and ecosystem well-being.

Coria and Stern (2011) identify four different categories to classify conservation policies and instruments: environmental regulations, market use, market creation, and public engagement. Payment for Environmental Services (PES) falls under the market creation category for ecosystem services, and a PES was initially defined as a "voluntary transaction where a well-defined ecosystem service (or a land use change likely to secure that service) is being 'bought' by (a minimum of one) an ecosystem service buyer from an (minimum one) ecosystem service provider if and only if the ecosystem service provider secures ecosystem service provision (requirement of conditionality)" (Wunder, 2005, p. 3). This definition has been changing over time based on criticism with its implementation and further analysis of what each of the items means in the contexts where they are being implemented, which among other characteristics tend to have complicated land tenure arrangements and little infrastructure to provide conditionality.

The PES concept commoditized natural resources providing a conservation outcome. Thus, when a PES is created a market value is given to the ecosystem service provided[1] -filtering and retaining water, for example. This commodification of nature has been criticized in the literature because it undermines the worth, meaning and importance of nature to humans(A. Vatn, 2000).

The motivation behind this thesis is to further the understanding of the places where an on-the ground PES program has found new and recurring challenges and the mechanisms through which PES schemes may change people's behavior. This understanding can help pave the way for further research on the possible effects a PES scheme will have once it ends. The use of the environmental values in the context of PES literature offers a new perspective into understanding the underlying foundations of motivational crowding out.

Ganaderia Colombiana Sostenible (GCS) is a PES scheme implemented in Colombia that pays for the protection of biodiversity in several regions of the country, by promoting sustainable cattle ranching practices that will also provide the protection of water sources and therefore the sustainability of cattle ranching as they enter into a future of more unstable climatic events.

This thesis contains two independent papers that aim to offer responses to two different research questions. Chapter one, "Filling the gap between the potential of PES and its ground-level realities," aims to explore the challenges and successes that one PES-like scheme has experienced through the process of implementation. We approached this task through interviews and surveys of stakeholders of the program as well as field visits in the coffee growing eco-region (one of the regions of the programs). In this chapter we find that even when the program is working hard at trying to avoid challenges described in the PES literature, new challenges arise and some others remain. GCS has found a way of using different strategies to approach the need to protect biodiversity and implement sustainable practices in cattle ranching and is seeking to constantly evolve and adapt to the new challenges they face at the ground level.

The second chapter, "Measuring Motivational Crowding Out of Payment for Environmental Services through Values, Beliefs and Norms," aims to use values, beliefs and norms to understand the crowding out effect from the perspective of what motivates individuals to act, rather than by examining the outputs. We approached this research studying three groups within one GCS program

[1] The payment provided is meant for the provision of one service, not a bundle of services that the ecosystem may provide.

region: one of PES beneficiaries, another of technical assistance beneficiaries and a control group outside GCS. We approached the behavioral measurement with a natural experiment to measure actual behavior as well as measuring values, beliefs, norms and other socioeconomic characteristics that would allow us to look at the foundations of their motivations. This final chapter raises more questions than it answers as it opens the door to the possibilities of studying crowding out through values, beliefs and norms. Interesting trends observed such as higher egoistic values found in the PES group lead to questions about the directionality of the effect and the implications of these results. These same questions point to additional research topics that may shed further light on the interplay between incentives and motivational crowding out.

CHAPTER 1

FILLING THE GAP BETWEEN THE POTENTIAL OF PES AND ITS GROUND-LEVEL REALITIES

1.1 Introduction

Historically, regulations and fines were a common approach to resource management (Coria et al., 2011; Kerr et al., 2007). However, nowadays new approaches, such as Payment for Environmental Services (PES), have been developed to compensate rural dwellers living in vulnerable ecosystems providing ecosystem services, to receive payments to support conservation efforts or changes in land use. Payment for Environmental Services (PES) as a management approach is spreading worldwide through programs like REDD+ which is active in 16 developing countries and has a budget of over $35 million US dollars. (Un-Redd Programme Twelfth Policy Board Meeting, 2014).

PES was initially defined by Wunder (2005) as a "voluntary transaction where a well-defined ecosystem service (or a land use change likely to secure that service) is being 'bought' by (a minimum of one) an ecosystem service buyer from a (minimum one) ecosystem service provider if and only if the ecosystem service provider secures ecosystem service provision (requirement of conditionality)" (p.3). This definition is often associated with the Coase Theorem (Engel et al., 2008), which is characterized by low transaction costs and well defined property rights. However, this definition has been criticized in the literature because of its lack of applicability where PESs are being implemented. The literature on PES indicates that transaction costs might become too high when there are too many smallholders (Kerr et al., 2014), or when there is a need to gather technical information to clarify causal relationships between land use practices and the delivery of ecosystem services (Muradian et al., 2010). In addition, in many cases the implementation of PES is not voluntary (Roldan Muradian et al., 2010; Tacconi, 2012). For example in many of the implemented programs buyers are paying for an ecosystem service on their water bill without choosing to do so. This payment is imposed on buyers[2]. Also the "well-defined ecosystem service" oversimplifies complex biological realities of ecosystems that are not yet fully understood or are extremely difficult

[2] In this particular case, the water company acts on behalf of its customers and the water company definitely enters this arrangement voluntarily.

to synthetize in a scheme of this type (Fisher et al., 2010). Finally, in order to pay those who provide the service, clear property rights are needed, yet this is not the case in most of the developing world (Pagiola et al., 2005). Due to the above limitations the definition of PES has been changing, so for example, in the ecological economics literature a PES is defined as "a transfer of resources between social actors, which aims to create incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources" (Roldan Muradian et al., 2010, p. 1205). In a response to the criticism, Wunder (2014) crafted a new definition for PES as "1) voluntary transactions, 2) between service users, 3) and service providers, 4) that are conditional on agreed rules of natural resource management, 5) for generating offsite services"(p. 8) that describes what characteristics a PES should have.

Latin America has high numbers of PES or PES-like[3] schemes being implemented or in the pilot stage (Grima et al., 2016; Southgate et al., 2009). The PES programs being implemented in the region pay for different ecosystem services such as water quantity, biodiversity, carbon and landscapes (scenic beauty). Provision of water is one of the most common ecosystem services to be used in PES schemes due to the vital need of the resource, the increase in pressure to the service due to climate change and increased demand as well as the need to create alternative ways of securing its supply (Grima et al., 2016; Southgate et al., 2009). After analyzing 40 cases in Latin America, Grima et al., (2016) found that program success is mostly achieved when the sellers are private, with private buyers who received only in-kind payments from a project that lasts between 10 and 30 years at a regional scale. A regional scale in this study "referred to the land area the scheme was formally targeting" (p.26). Finally they also need to have a well-defined ecosystem service and must not have any intermediaries.

Colombia is creating innovative mechanisms to finance conservation including PES. For example, through article 111 of law 99 (Congreso de la Republica, 1993), the national government mandates that all municipalities place at least 1 percent of their budget into the acquisition, maintenance and/or implementation of PES schemes to conserve and maintain water resources. Southgate et al., (2009) affirm that compared to other countries in the Andean community, Colombia is in the advanced stages of PES development, following Ecuador, and as compared to countries such as Peru, Bolivia and Venezuela.

[3] PES-like schemes are those that do not have one of the five characteristics of the PES definition Wunder (2014).

In this paper we look at the gaps between the literature in PES and the ground level realities in one PES case in Colombia where payments are being exchanged for biodiversity conservation. This is a PES-like scheme with a well-defined proxy to measure biodiversity, the ecosystem service being paid for, many providers of the service and a voluntary transaction under conditional payments. The characteristic that makes it PES-like and not a full PES is that the buyer of the service is an international stakeholder that in this particular case will not maintain payments in perpetuity. The gaps between PES literature and ground level realities were examined by a series of interviews with beneficiaries, managers and staff members of the program as well as some individuals from the region.

1.2. The Program: Mainstreaming Biodiversity into Sustainable Cattle Ranching in Colombia

1.2.1 Background

A pilot of the program was implemented between 2002 and 2007 and was reported by Pagiola et al., (2005). The authors showed initial successes in the program "The Regional Integrated Silvopastoral Ecosystem Management." The pilot tested the use of PES as a tool to conserve biodiversity and sequester carbon in watersheds of Colombia, Costa Rica and Nicaragua. In Colombia the program took place in the La Vieja watershed, where the Research Center for Sustainable Systems of Livestock and Agricultural Production (CIPAV) implemented the project.

The payments in this pilot were financed by the Global Environmental Facility (GEF) and distributed based on the biodiversity conservation index (number of species/number of individuals)[4]. The logic behind this program was to tip the balance and encourage producers to opt for silvopastoral systems instead of pure pastures. Pagiola et al., (2005) claim that the initial investment needed to implement silvopastoral systems and the time lag between investment and returns make these practices unattractive to beneficiaries in spite of "the long-term benefits" they offer (Pagiola et al., 2005, p. 208). This payment was provided annually over a four-year period after paying an initial baseline for all the services that were being provided when the program started.

[4] The conservation index is calibrated from most biodiversity-poor land use (annual crops) at 0.00 to the most biodiversity-rich land use (primary forest) set at 1.0.

The program offered to pay US$75 for every point incremented in the biodiversity conservation index over the four years. To avoid a perverse incentive to clear cut the terrain the program included a baseline that provided one-time payment of US$10 for every existing point in the biodiversity conservation index. The idea was that by the end of the program the silvopastoral systems will generate revenue independently for the beneficiaries and thus no payments would be necessary after that period.

Pagiola et al., (2005) reported that the program was a success in Colombia as it increased the biodiversity conservation indexes by 0.19/hectare on average. They also reported positive initial impacts on biodiversity provided due to changing the land use to silvopastoral systems, based on the monitoring of birds, ants and other species, compared to other land uses. Finally, Pagiola et al., (2005) note that the main challenge for this program is to find sustainable funding sources. One option they suggest is to tie the silvopastoral system implementation to a water payment since they found preliminary results on the effectiveness of silvopastoral systems on water quality. However this option may not be possible in all regions.

1.2.2 The current program

From the original pilot program in La Vieja watershed, Colombia, described by Pagiola et al., (2005) a nationwide program was designed seeking to protect key areas of the country. The program was named: Ganaderia Colombiana Sostenible -GCS (Mainstreaming Biodiversity into Sustainable Cattle Ranching in Colombia). The main objective of the program is to achieve sustainable use of natural resources in cattle ranches within the program's areas. The program aims to implement the use of biodiversity-friendly silvopastoral systems to enable greater biodiversity conservation and the reduction of degraded soils. To achieve this objective, GCS uses an integrated approach to incentivize the adoption of sustainable cattle practices.

The program was created through a coalition between: Colombian Cattle Fund (FEDEGAN), Research Center for Sustainable Systems of Livestock and Agricultural Production (CIPAV), Fondo Acción, and the Nature Conservancy (TNC), and it continues to be funded by the World Bank and GEF. This program was scheduled to last five years and the contracts made in the program are all clearly finite with the intention of tipping the balance in the implementation of silvopastoral systems. GCS began in 2010 and was supposed to last until 2015. However the United Kingdom provided

funding to extend the program and expand it to two more areas of the country until 2018. Throughout the program's' life three calls were made for participants to join it. Approximately 4000 applications were received, and 2900 individuals were approved to be beneficiaries of the program. The first call was made in June 2011, the second in April 2012, and the third call was done during the first half of 2015.

The program prioritized five eco-regions of the country that require a further understanding of the needs of each region. The regions are: Low Magdalena, Cesar River Valley, Boyacá-Santander, Coffee eco-region and the Orinoco foothills. The regions were chosen based on the following characteristics: high biodiversity levels and closeness to strategic ecosystems and/or protected regions. These regions include tropical dry forest and wetlands associated with the Magdalena River. The majority (98.5%) of the cover in the tropical dry forest ecosystem in Colombia has been degraded. The wetlands associated with the Magdalena River are considered a priority due to the presence of migratory birds and endemic species by the International Union for Conservation of Nature (IUCN) and TNC. With the new funding provided by the U.K the program was extended to two more eco-regions: the dry forest region between the Sierra de Santa Marta and the Serrania de Perija and the foothills of the Sierra de la Macarena in the department of Meta. From the initial pilot in Colombia, the program has not only increased in the number of organizations managing it (before it was only CIPAV), but also in the number of regions where is working and because of that the beneficiaries have gone from a few hundreds to two thousand beneficiaries.

1.2.3 The beneficiaries

The participants of the program were summoned by a call that sought beef, milk and dual purpose ranchers located in one of the five regions prioritized by GCS. Depending on where within these locations participants have their ranch, they will have access to technical assistance and if within the strategic regions they also have a Payment for Environmental Services; this will also result in different responsibilities towards the program. If the land was located outside the connectivity corridors[5] and within the prioritized regions of the program their beneficiaries were limited to technical assistance. Technical assistance (TA) beneficiaries commit to adopt sustainable cattle

[5] Connectivity corridors are defined by the program as patches or fragments of forest that allow for fauna and flora species to circulate and propagate.

ranching practices in their ranch, as the program commits to providing technical assistance to help them do this in the best possible way. Those whose land touches or is within a connectivity corridor are then eligible to receive technical assistance and PES. The PES requires the beneficiary to commit to implementing sustainable cattle ranching practices in its ranch and protecting existing environmentally-friendly land uses. In exchange the program pays for the environmental services, which in this case is an environmentally-friendly land use change, or the continued protection of existing environmentally friendly land uses. The payment provided as a base line recognizes that those uses are good for the environment, as well as costly for the producer. Those benefiting from PES also receive technical assistance to ensure the optimum land use change for this region. The payment is contingent on the verification of the change in the land use to a more sustainable one and/or protection of currently sustainable ones.

To participate of the program, interested ranchers must present the following documents:

Table 1-1: Documents required to become a beneficiary of GCS.

<table>
<tr><th>Document</th><th colspan="2">Description</th></tr>
<tr><td rowspan="7">Form with basic information[1]</td><td colspan="2">Personal information of the rancher (name, I.D. number, address, phone number, among other)</td></tr>
<tr><td colspan="2">Description of the land (location within the shire (district), municipality and department; total area in hectares)</td></tr>
<tr><td colspan="2">Description of the area of the ranch allocated to cattle ranching (specifically the pasture areas in hectares)</td></tr>
<tr><td colspan="2">Description of the areas allocated to uses other than cattle ranching (such as areas of forest, agroforestry systems and/or crops)</td></tr>
<tr><td colspan="2">Information regarding land tenure (the cattle rancher must indicate whether he/she is owner, possessor in good faith or holder)</td></tr>
<tr><td rowspan="2">Information on the family living in the land:</td><td>Number of people living in the ranch and their relation to the rancher</td></tr>
<tr><td>Age and education level of each individual</td></tr>
</table>

Table 1-1 (cont'd)

	Information about the ranch	Number of cattle heads
		Type of farming: beef, milk and dual purpose
		Other production systems
Copy of I.D card of all the land owners, holders or possessors.		
Criminal background check		
Certificate of free and clear title		
Copy of legal documents that demonstrate the ranchers' condition of owner, good faith holder or possessor of the premises.		
Copy of the certificate of vaccination against foot-and-mouth-disease.		
[1]By signing to the form the rancher certifies that the ranch currently. * Has no judicial disputes or claims. * The main economic activity of the ranch is cattle. * Has not deforested more than 5% of the forest in its premises in the last three years.		

Participants need to submit the above documents to the regional offices of FEDEGAN (see Table 1-2). Once the six documents are submitted, then the project undergoes a technical evaluation to accept or not the participants. The technical evaluation includes:

1. Study of titles and tenancy of potentially eligible cattle ranches.
2. Geo-tag the ranches that passed the filters to confirm locations within the program regions
3. A point system evaluation based on the following criteria if passing the previous two evaluation criteria.

Table 1-2: Point system used to gather baseline information for GCS beneficiaries both TA and PES.

Criteria	**Type of program: Technical Assistance**	**Type of program: PES with technical assistance**
Premises located within the connectivity corridor. If the premises touch the axis then they obtain points	Non-Applicable	10 point

Table 1-2 (cont'd)

The participant is considered small cattle rancher	15 points	10 points
The premises have at least 20% of forest cover from the total area	10 points	10 points
The premises have between 5% and 19% of forest areal from the total area	5 points	5 points
The rancher belongs to an association of livestock producers	5 points	5 points
The premises are located less than 100 meters from a natural forest patch bigger than 30 hectares.	5 points	5 points
Percentage of the premises area inside the connectivity corridor.	Non-Applicable	10 points (maximum)
Eight neighbors of the premises, located in the same shire have applied to be part of the program.	15 points	Non-Applicable

Participants are approved based on their score from highest to lowest. And if there are too many applicants to the program due to budget limitations then the score chart will untie the situation.

1.2.3.1 Technical Assistance - TA

Those who receive technical assistance will develop a "Ranch Plan" supported by the technicians of the program. This plan includes a five-year strategy to develop more sustainable cattle ranching practices and maintain or increase productivity. The TA beneficiaries will also receive training and assistance by FEDEGAN programs of extension, and improvements for small cattle ranchers by ASISTEGAN. In addition, they also receive free TA to establish and manage silvopastoral system throughout the duration of the program. They also receive instructions on how to access credit with FINAGRO and other credit sources. Finally, they receive formats and methods to keep track of

their ranch's productivity and costs of production. The program intends to make all beneficiaries positive examples for their neighbors and surrounding community.

1.2.3.2 Paying for Biodiversity -PES

Once baseline data is submitted and the participant is approved for PES in the program, the beneficiaries receive their first payment for the baseline as it was explained to the authors in several interviews with managers of the program. The beneficiaries of PES are also receiving technical assistance to help them navigate through the process of changing their land use into silvopastoral. This payment seeks to provide beneficiaries with incentives to keep what they have protected up to now, but also to prevent beneficiaries from clear cutting their land in order to receive more payments for planting new forests (Pagiola et al., 2005). For the Baseline they get paid US$18 for every hectare of mature forest or private wetlands, and US$17 for every hectare of secondary forest as part of their baseline payment. Later every year the beneficiary will receive payments for changes in land use or for keeping land protected: US$75 per hectare of mature forest or private wetlands, US$71.25 for every hectare in secondary forest, US$52.5 per hectare with dispersed trees and managed vegetation succession. In addition, they get paid US$7.5 extra if the lands are in the axis of the corridor, plus US$7.5 for the use of native species to conserve the local biodiversity, US$37.5 per hectare of agroforestry crops with at least two strata[6] with an extra US$15 if the agroforestry land use is within the axis of the corridor and US$7.5 extra for the use of native species in their agroforestry crops. The program will also pay US$7.5 for every kilometer of live fences and wind braking live barriers, with extra US$3.75 if they are within the axis of the corridor and US$3.75 extra for the use of native species in the fences or wind braking barriers. Finally the program will also pay US$7.5 for the use of native species in Intensive Silvopastoral Systems (ISS) (>5.000 trees/ha) and US$7.5 for the use of other farming practices (transitory crops, forestry plantations). Nothing will be paid for soils with degraded pastures. Each beneficiary can have up to US$6,500 during the five years. This means that once a beneficiary has earned US$6,500 then no more payments are given. There can be cases in which a participant may get enough points to earn that amount or more with the baseline, in that case the participants will receive the top amount (US$6,500) and they will not receive any more payments, but they will continue to receive TA.

[6] Two levels of vegetation in a vertical axis

1.3. Methods

The challenge with implementing a PES scheme such as GCS is bringing a concept from theory into practice. Through this paper, we will describe how this process was done in this particular program. In order to achieve that, we interviewed eight managers of the program, six extension specialists and two producers receiving PES. This information is complemented with field observation and the results from a completed survey with 50 ranchers who had a PES agreement and 50 ranchers who only received TA from the coffee eco-region where this study took place. Our goal is to describe the challenges and successes the program has faced.

1.4. Challenges and successes of implementing Ganaderia Colombiana Sostenible

Scholars studying PES have criticized and exposed challenges in their implementation. In this section, we make reference to some of these first by signaling some of the ways the program prepared itself to face and overcome some of these critics, second by describing the challenges more commonly discussed in the interviews and linking those to the literature, and finally by describing some new challenges that this program is facing but that were not reported in the literature.

1.4. 1 Overcoming some critics and challenges ahead of time

Ecosystem services are difficult to measure, so an alternative that has been implemented and reported in the literature is to measure inputs rather that outputs, thus measuring land use changes instead of measuring the services provided (Alston, Andersson, & Smith, 2013). This particular challenge inspired GCS to create a point scale where the payments are made for land use (change and maintaining sustainable systems) not for the ecosystem service in itself. The program rationale is that by making the land use changes the rancher is also improving biodiversity.

One of the key factors of PES is conditionality. To ensure the success of the program, monitoring has to be strong, and provide a basis for conditionality of payments. Pagiola et al., (2005) warned that paying only for incremental improvements created a perverse incentive to clear the land first in order to get the highest possible payment in the long term. Based on that finding the program-- in order to address conditionality—designed a baseline to assess what each of the plots already had. This baseline was produced to have a starting point from which to pay, but also as way to pay for the conservation efforts already in place in the different plots. The creation of the baseline requires

plotting the edge of the ranches and characterizing all covers of the plot. For some properties that process took close to a week to complete.

Although the baseline guarantees a good measure for the conditionality, it also took more time to complete than planned. These delays, in turn, created a delay in payments and in the technical assistance, given that those who were collecting the baseline data are the same personnel who provide the technical assistance. Now the program is in its second round of visits where they are monitoring the plots to verify what land use changes each rancher has made (for example change from traditional pastures to silvopastoral systems) or protected (primary forests) based on the initial arrangement agreed upon. This process again is taking too long compared to what was expected by the ranchers and GCS. In response to these delays, the program is thinking of changing the strategy into self-reporting measures that will be randomly monitored. This could reduce the costs (particularly time and money) but might imperil the conditionality of the payments since the monitoring process would have incomplete coverage.

Kronenberg et al., (2013) raise the question of whether PES could create an "Ecosystem Service curse". The authors' concern is based on the possibility that when paying what has been considered as the "real value" of ecosystem services there would be a generation of significant revenue especially in poorer places with higher natural capital provoking a "resource curse"; similar to the "Dutch disease"[7] that happens when important resources are exploited such as coal, petroleum or gold. This curse affects not only the livelihoods of the communities but also the way they relate to their environment. To address this concern, GCS used biological information to determine the ranchers of high priority for conservation by how close these are to strategic ecosystems and protected areas. Beneficiaries within these locations could get PES. Participants out of this area, but within the region were only eligible for TA. Within the regions the program has delimited very specific areas established for PES and a buffer zone that includes only TA. On top of that, during the interviews staff members affirmed that GCS has made it clear to beneficiaries that the program is finite through the five year contracts, and the great emphasis placed on the main objective of the program of increasing productivity through sustainable management strategies that will in the long run become the "payment" for being sustainable. Additionally, the payments are not paying for the

[7] "The Dutch disease concept suggests that large resource revenues may lead to a significant inflationary pressure and shift production factors to the extractive sector, to the detriment of other sectors" (Kronenberg & Hubacek, 2013, p. 2).

complete bundle of services that the system provides but it is paying something to tip the balance in the process of changing land use and protecting biodiversity.

GCS has established the payments as a compilation of points that are agreed upon in the beginning when signing the contract. These agreements are achieved with the understanding that once the contract is over they will be able to see considerable improvements in the production from their ranch. The objective of the program is not to create dependency, but to help jump start the transformation of land use into more sustainable practices within cattle ranching. This is the advantage of having a short-term program that has a clear deadline that it is well known by all beneficiaries.

It is also reported in the literature that there is an increase of potential property rights claimants once there is PES in place (Ellsworth et al.,, 2004). PES schemes have to deal with the complexity of land tenure arrangements found in places like Colombia, where in the context of uncertain land tenure and unequal bargaining powers may surface and in most cases create exploitation from buyers to the providers whose land tenure is uncertain (Kronenberg et al., 2013). The PES literature identifies that it is not always clear who should benefit from the payments and how the payments should be distributed, especially when facing community-owned lands or when the land belongs to one person but the one doing the conservation effort is a renter (Alston et al., 2013; Loft et al., 2014), In the case of GCS the requirements of the contract allow for both the renters and the owners to be better off. From the interviews, we identified one case in which the renter and the owner of one plot of land were sharing the benefits of the payments. This however was not common, on the contrary the amount of paperwork required to become a beneficiary of the program became a barrier for some ranchers to join the program and the possibility or willingness of sharing benefits was not clear for many producers.

Finally, one aspect of transaction costs that has been a great challenge for the program as well as great success according to the managing and extension staff is the cost of training personnel on how to achieve sustainable cattle ranching as well as the need to create a market for native species that did not exist before. There is a clear need for extension staff that is knowledgeable. And the incentive the program has put on the native species market for cattle ranching uses.

1.4.2 GCS' Challenges Identified in the PES Literature

A recurrent topic found in the interviews was the complexity of the program itself that encompasses four organizations that had never before worked together, in addition to having the program implemented in five different regions of the country but managed centrally in Colombia's capital, Bogota. These two factors create long administrative processes and delays which in turn create mistrust in the program by the beneficiaries. For example, participants in the PES program got the payment from the baseline at different times and at the time when these interviews were being done some had only recently received their payment, and since then they have not received any other payment. The payments are delayed by two years, and this is creating dissatisfaction among beneficiaries. Additionally, delivery of inputs such as tree saplings was delayed which resulted in large losses. Specifically, the trees were delivered in the dry season instead of the rainy season when they were expected and were supposed to be planted. In some cases the trees became useless and in other cases it was too costly to the rancher to plant the trees and irrigate them. These challenges are perfect examples of high transaction costs that are so often mentioned in the PES literature (Alston et al., 2013; Kronenberg etl al., 2013).

Loft et al., (2014) highlight the need of having clear roles for different actors to minimize problems. These concerns surfaced in interviews with program staff, particularly at higher levels where the work with other organizations was a notorious challenge at the beginning of the program. Nowadays these roles are more clearly developed, after each organization got to learn from the other organizations. They have now a common language and procedures. The program is working very hard at keeping its operation transparent. Nonetheless the amount of paperwork and need of approval of many organizations at different levels creates confusion. During the interviews and surveys some ranchers felt this delay was a sign of the program hiding something from the public.

With uncertain tenure and unclear land property, PES programs may become a source of corruption due to rent seeking. Rent seeking increases as the programs get larger and more widespread, and as interest in the previously "value-less" resources resurges and new actors or actors distant from the resource take over rent (Kronenberg et al., 2013). During the interviews, some ranchers suspect that the delays in the payment were the result of corruption from the government and the international organizations. In other interviews it was mentioned that the lack of clarity with respect to the agreements and payments were deepening the mistrust of the people in the program. Given that

there is no evidence of corruption in or across the organizations, GCS need to actively clear and improve their relationship to the beneficiaries and people from the region.

To offset the feelings of injustice and reduce the spillover effect that the authors discussed, in the case of other ranchers living in the region but not getting the PES, GCS had clear and transparent criteria to select the PES beneficiaries as it is advised in the literature. In addition, the extension staff is available to respond to any questions from neighbors of the beneficiaries in the program who did not qualify for training on implementing silvopastoral systems and more general sustainable practices. This was successful as some members of the extension staff expressed seeing some neighbors being more invested with silvopastoral systems than the PES beneficiaries. Nonetheless there are still some individuals who are not satisfied with the fact that they are either not receiving payments or are not part of the program at all as it was reported by J. Kerr et al., (2014).From the survey, we noticed that 16 TA beneficiaries know of the existence of economic incentives within the PES (Figure 1-1) so is it possible for them to be dissatisfied about their exclusion from the program. From Figure 1-1 it is surprising that 46 percent of PES beneficiaries responded that they did not know anyone that was a PES beneficiary while 86 percent of them acknowledged that they currently receive PES).

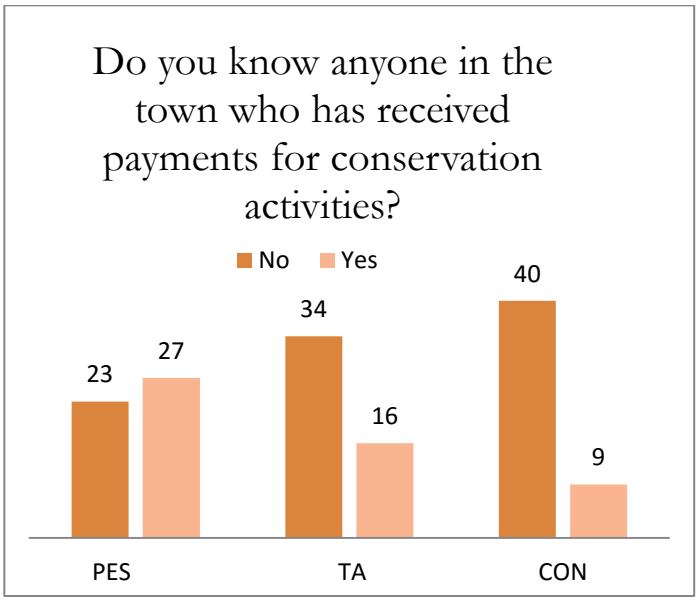

Figure 1-1: Graph: Survey response to whether or not individuals know of PES schemes in their area. One participant in the con group did not respond

The other challenge faced by GCS that has been raised in the literature, but has not been addressed empirically, is the payment amount that can create behavioral change. Within the PES beneficiaries

there is a percentage of individuals who "don't know" if they have received payments (14%), which was consistent with the findings of Kerr et al (2014). This situation is worth evaluating, since according to the program some of them had already received payments. This fact might be vital to understanding if the payment is significant enough for all the beneficiaries. We spoke to one person per household, the owner, and it is possible that this person is not actively taking part in the day-to-day accounting or activities of the ranch. Another possibility is that they have only received the baseline and are not counting that as a payment. Finally, it raises the question of whether or not the individuals know what they are being paid for, and if they do, is it significant enough to alter behavior? (Figure 1-2).

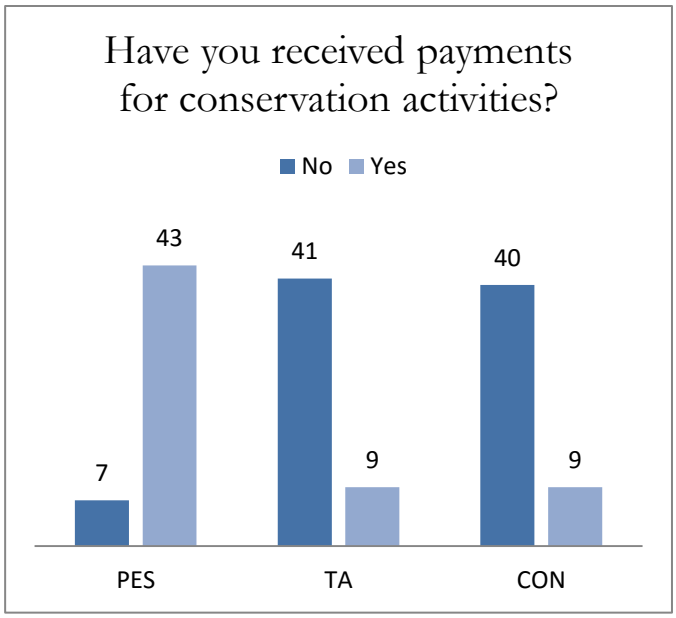

Figure 1-2 Graph: Survey responses to whether or not individuals receive PES. One participant in the con group did not respond

Finally, it is important to observe that the program is not very well known outside of the beneficiaries. This also raises the question about the effectiveness of the calls made by GCS since they were supposed to be public and well-known around the region. In the case of technical assistance, 62 percent of the beneficiaries who only receive technical assistance and 72 percent of the PES beneficiaries who also receive TA are aware of others who receive in-kind benefits in exchange for participating in conservation efforts (see figure 1-3).

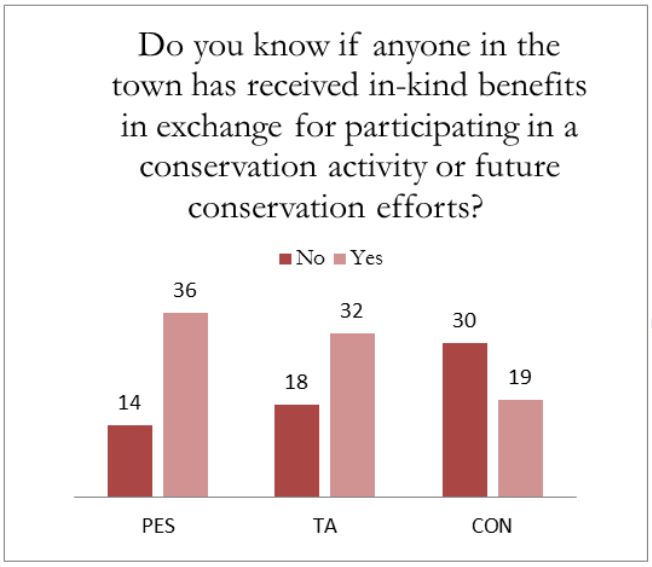

Figure 1-3: Graph: Survey responses to whether or not individuals know of PES schemes in their area. One participant in the con group did not respond.

For most TA beneficiaries it is clear they are receiving technical assistance to implement silvopastoral systems. This could mean that the relationship between the protection of biodiversity and receiving TA on silvopastoral systems is clearer than the relationship between the implementation of silvopastoral systems (sustainable cattle practices) and the delayed monetary payments alongside the delivery of TA. This may change once the payments start to normalize.

Lastly, a critique that has been made of PES where the buyers are not other users but organizations like the World Bank through the Global Environmental Facility (GEF) that are buying conservation services on behalf of the global community is that it violates one of the principles of PES where it is the direct users of the service the ones that pay to ensure there are incentives on both sides to protect and monitor the service being protected (Pagiola et al., 2005).

1.4.3 New Challenges faced by this program

During interviews with the extension service agents a common theme that they discussed was the differences of opinion between the hired manager of the ranch and the owner. The program negotiates directly with the owner of the land, who does not always explain to the hired manager the benefits of the program, or the reasons behind his participation. The extension service agents have to deal with the hired manager of the ranch who makes all the decisions in the land; since the

program is bringing a new approach to management sometimes the hired staff in the ranch needs a lot of convincing to make the changes needed. This creates even more challenges as to how to change mindsets without the financial incentive (that is often kept by the land owner) but through other methods that can be used with and for all parties involved.

Even though the selection criteria for PES is very clear, this has created challenges, as some members of the extension team revealed in their interviews, that some ranchers that are not part of the PES but are currently receiving TA wish they were receiving payments. According to some of the extension staff members this distribution that divides people into those who are and those who are not receiving PES has created some feelings of injustice and unfairness among the TA beneficiaries. The PES literature has not addressed this topic in particular, but some authors are starting to address it with experimental economics in the lab. Alpizar et al., (2012) found that the payment of the incentives may generate a negative spillover in the actions of those excluded from the incentive. The original incentive becomes perverse for those participants excluded and can prompt less pro-social behavior. It concludes that an incentive based program might exclude previously pro-environment people. The authors express that pro-environmental action such as climate change mitigation is a socially desirable one. They also stress the fact that a clear understanding of how participants are chosen or have access to programs will help prevent or minimize the possible spillover effects (Alpizar et al., 2012).

Also, cattle ranchers and extension staff were constantly asking for further assistance with human labor, much more needed than supplies, since, all technical assistance offers requires high levels og manual labor that is growing ever more scarce. This petition is problematic since the labor is supposed to what the rancher puts in for the program yet it is hard to find and very expensive.

Another challenge is that payments have a cap. Having the program paying up to US$6,500 creates two challenges. First, some participants have already received the total payment, therefore although they are PES beneficiaries they now only receive technical assistance and no payment. Second, many ranchers thought they would all receive that amount and some who received less were disenchanted by the amount paid. These two situations can send mixed messages to the ranchers. On the one hand, what can the program ask from the producers that have already received the whole payment? In a way the program is saying that there are no more improvements to be made in the land and they are not paying for current and future maintenance of the conserved areas. And on the other

hand there needs to be clear means of communication at the moment of signing the contracts where it is clear that your payment amount depends on the performance of your ranch on the biodiversity index used as proxy for the land uses that provide the ecosystem service being bought. For project managers a problem they face is that once the payment cap is reached then conditionality ends.

Another consistent challenge mentioned by extension staff and farmers during the interviews and when they were being surveyed is the desire of getting the program to provide actual paid labor since labor entails part of the highest monetary investment but also because manual labor is becoming ever scarcer in the area.

1.5 Conclusions

In this paper we analyze Ganaderia Colombiana Sostenible as a Payment for Environmental Service -like scheme being implemented in Colombia. We use this program to show how PES schemes are overcoming challenges and critiques made in the literature by measuring the ecosystem service, creating a baseline for conditionality and avoiding pervasive incentives, address land tenure concerns, and finally the great challenge and opportunity this program found in the need to train personnel and create markets for native species that will continue to exist once the program is over. From this, we can say that PES programs are responding to the critiques and challenges reported in the literature by adopting new procedures that will benefit both people and the environment.

We also report that despite the efforts to overcome challenges, we found signals that other criticisms and challenges that have been reported in other PES programs are persistent in this program. In particular, challenges like high transaction costs, fear of corruption, or having an international entity be the "buyer" instead of a direct service user(s). Instigating feelings of exclusion and unfairness in spite of efforts to avoid them, the beneficiaries of the payment do not know other beneficiaries of the payment. Some of these problems have resulted from the work that has been placed on attending to some of the critics above. GCS while making an effort to have conditionality, a key component of PES, has walked into high transaction costs for themselves. These challenges are part of the learning experience this program is going through being one of the first nationwide programs in the country, and one of the first in Latin America paying for biodiversity.

Finally, we also discussed new challenges that had not been identified in the PES literature but that are extremely important in this context such as who is paid vs. who makes the decision at the ranch level, having a payment cap, who knows about the payment within the program and in the region, and finally the constant request from extension staff and ranchers of being provided manual labor instead of payments. Even though these challenges have not yet been reported in the literature, it is possible that while these may have been present in other programs they may not be as pronounced as here, or went unreported.

Further research is needed to understand the power dynamics within the seller receiving payments, by understanding that although the payment is made to individuals, these individuals are embedded in a system that might constrain or enhance their implementation capacity. Also to understand what happens with individuals who receive the complete payment before the term of the program is over, what is the message this sends and how can it be improved.

GCS has not aimed to use PES as a silver bullet but it has made it one of the tools used to make cattle ranching in Colombia a more sustainable practice that benefits biodiversity, rather than the other way around. The measures of the baseline will provide great insight once the program is over to measure what the program has changed and compare it to the control group. And finally just like we aim to decentralize other management practices, GCS should seek ways to give decision making power to staff members closer to the resource.

While GCS is overcoming some of the challenges the literature has identified, we must highlight that the challenges faced by GCS, both the ones already reported by other PES projects and those that were not identified in the literature before this study, are evidence of a gap between the Payment for Environmental Services literature and the ground-level realities of a PES scheme.

CHAPTER 2

MEASURING MOTIVATIONAL CROWDING OUT OF PAYMENT FOR ENVIRONMENTAL SERVICES THROUGH VALUES, BELIEFS AND NORMS

2.1 Introduction

The rapid growth in the implementation of Payment for Environmental Service (PES) schemes has raised a number of concerns. PES schemes have been thought to provide a win-win situation, where not only would the ecosystem service be protected, but that the people providing the service would be better off (Miles et al., 2008; van Wilgen et al. 1998). Yet, because PES implied a commodification of nature, it has been found that payments may alter existing attitudes[8] and generate new motivations related to the natural resource and ecosystem service driven by the financial incentives (Dudley, 2007; Kerr et al., 2014; Milne et al., 2012; Saito-Jensen et al., 2014). These leads to asking what the directionality of these effects could be. Weather it is the payments causing the alteration of existing attitudes or is it individuals with certain attitudes the ones participating of these paying programs? These concerns are being studied under the umbrella concept of crowding out.

The hypothesis of motivational crowding out, described by Bowles et al., (2012), is that when humans are presented with financial sources of motivation these can displace social and personal sources of motivation, as humans are driven by multiple sources of motivation that are not necessarily additive but rather can displace each other. This hypothesis has been tested through field and natural experiments where economic incentives seem to crowd out people's intrinsic motivations. In the experimental literature, crowding out has been measured through behavioral outputs before and during the implementation of the incentive (Rode et al., 2014).

Kerr et al., (2012) reported a natural experiment conducted in Tanzania and Mexico where they tested how people' pro-social behavior responded to incentives the experimenters were providing (not a program like in our case). This paper shows how motivational crowding out occurs when a

[8] Attitudes such as: environmental ethics, collective action, pro-environmental behaviors and attitude

payment is involved. The authors invited people to participate in an activity following three incentives: no payment, individual payment and community payment. The activity they organized to measure pro-environmental behavior was a two hour effort to collect litter from the village streets.

Values, Beliefs and Norms (VBN) have been used to understand the foundation of pro-environmental behavior since its inception (Stern et al., 1994) by showing clear links between environmental beliefs and behavioral intentions (in this case willingness to pay higher taxes for the environment). This theory has been used to understand pro-environmental behavior in the context of monetary donations, recycling, and restoration activities among others. But it has yet to be used to understand behavior within a conservation management scheme such as PES.

This paper contributes to the existing literature on PES, in addition to the literature on motivational crowding out, as it identifies how the PES may be affecting the beneficiaries' pro-environmental behavior in particular users' values, beliefs, and behavior towards the environment. We investigate if there is some type of motivational crowding out (Bowles et al., 2012; Cardenas , et al., 2000) among different types of PES beneficiaries: some receiving monetary incentives and technical assistance and others receiving only technical assistance. We measure motivational crowding out, not with regards to behavioral outputs but by measuring the foundations (values, beliefs and norms) of the motivations behind the behavior.

Ganaderia Colombiana Sostenible (GCS) is a PES program seeking to achieve sustainable use of natural resources by cattle ranchers in seven regions of Colombia. The program began the first of three calls in 2011, but due to the need for baseline studies, at the time of this research very few ranchers had received payments beyond the baseline. The program promotes biodiversity-friendly silvopastoral systems that incentivize greater biodiversity conservation and the reduction of degradation of soils. The program aims to incentivize this land use change through two different strategies. In one, the program has prioritized certain areas within each region, because they are either biodiversity-rich places or because they can connect strategic areas by the maintenance of patches that can become biodiversity corridors connecting protected areas or other big forest patches. This prioritization has created clear boundaries to the implementation of the PES scheme and its beneficiaries. The delimitation of these strategic areas establishes clarity on who gets payment and who does not. The second strategy provides technical assistance alone to those

ranchers interested in being in the program but whose land although in the region is not in the prioritized areas.

This research contributes a number of novelties to the literature: first, to the best of our knowledge, we are the first to connect Values Beliefs Norms (VBN) theory to a natural experiment that can assess actual behavior, and we also measure hypothetical behavior and intended behavior. Second, we extrapolate the concept of motivational crowding to a different measurement approach that includes the foundation of motivations, understood through the VBN. Finally, as far as we know this is the first study using VBN theory applied to the environment in a rural setting of a developing country.

2.2. Theoretical framework: Values-Beliefs-Norms Theory

In this section, we will first explore the definitions of values, beliefs and norms and then we describe the ways in which those have been measured. Then, we explain the Values-Beliefs-Norms (VBN) causal model as it pertains to how it has been related to pro-environmental behavior.

2.2.1 Environmental values, beliefs and norms: some definitions and their measurements for this study

Rokeach (1968), a pioneer working with *values* and their measurement, has been the basis on which values research has been used in understanding pro-environmental behavior 2005). The author defines values as "enduring beliefs that a specific mode of conduct is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence" (Rokeach, 1968, p. 160). For this research we used the above definition of values as it was used by Schwartz in the design of his values survey in Schwartz (1992).

Several measurement tools have been designed to measure values based on Rokeach's definition. Although using the same definition, these measurements have classified values differently. Some of these different classifications (see for example, Inglehart, 1971; Steg et al., 2014) are very relevant, however they do not focus on environmental values, therefore they are not relevant in the context of this research. In the midst of understanding environmental values and measuring them Schwartz

developed the *Schwartz value survey* based on Rockeach's definition. This survey has 56 items grouped in four value clusters: openness to change, conservation[9], self-enhancement, and self-transcendence (Schwartz, 1992). Stern et al., (1995) found that two of Schwartz's value clusters were very similar to two Stern et al., (1993) "value orientations." Schwartz's self-enhancement corresponds to egoistic value orientation in Stern et al., and Schwartz's self-transcendence corresponds to social-altruistic value orientation in Stern et al., (year) (Table 2-1). Stern et al., (1998) after confirming the robustness of Schwartz's categorization of values, and due to their interest in environmental attitudes and behavior, divided the self-transcendence value cluster into two separate scales: biospheric and altruistic values.

Theory suggests that these five values could be influencing environmental decision making: self-interest values (egoistic), altruism values (towards other humans), and biospheric values (altruism toward other species and the biosphere), traditionalism and openness to change (Dietz, 2015b). Values are presumed to be more stable than general attitudes (Stern et al., 1995). In the framework for encouraging pro-environmental behavior it is theorized that when targeting only hedonic values – those that value self-gratification and pleasure (see Table 2-1) – and look for considerations to achieve pro-environmental behavior these might result in the action only lasting as long as the behavior stays a pleasurable or gainful one (Steg et al., 2014). Table 1 (Dietz, 2015) shows the commonly used environmental values scales used to understand pro-environmental decision making and attitudes.

Table 2-1: Commonly used environmental values scales (Dietz, 2015a).

Stern et al., (1998)	Steg et al., (2014)	Schwartz, (1994)
Biospheric altruism	Biospheric altruism	
Protecting the environment, preserving nature	Protecting the environment	Universalism
Unity with nature, fitting into nature	Unity with nature	Universalism
Respecting the earth, harmony with other species	Respecting the earth	New[1]
---	Preventing pollution	---
Humanistic altruism		
A world at peace, free from war or conflict	A world at peace	Universalism

[9] Due to the use of this word in the environmental literature this term will be referred to as tradition as in Dietz et al., 2005.

Table 2-1 (cont'd)

Social justice, correcting injustice, care for the weak	Social justice	Universalism
Equality, equal opportunity for all	Equality	Universalism
---	Helpful	Benevolence
Traditional (Conservation)		
Honoring parents and elders, showing respect	---	Conformity
Family security, safety for loved ones	---	Security
Self-discipline, self-restraint, resistance to temptation	---	Conformity
Self-interest (Egoistic or Self-enhancement)		
Authority, the right to lead or command	Authority	Power
Influential, having an impact on people and events	Influential	Achievement
Wealth, materials possessions, money	Wealth	Power
---	Social power	Power
---	Ambitious	Achievement
Openness to Change		
A varied life, filled with challenges, novelty and change	---	Stimulation
An exciting life, stimulating experiences	---	Stimulation
Curious, interested in everything, exploring	---	Self-direction
Hedonic values		
	Pleasure	Hedonism
	Enjoying life	Hedonism
	Gratification for oneself	---
[1] Not included in the Schwartz protocol 1994		

When introducing a PES scheme, the agency implementing it is ultimately trying to promote conservation behavior through the creation of a market that can include economic and/or in kind incentives in order to accomplish conservation. By doing this, it highlights that there is some economic value to gain, in this case by adhering to the promoted behavior. The literature on economic incentives identifies the creation of this link as a possible source of crowding out (Cardenas et al., 2002; Kerr et al., 2014; Lopez et al., 2013; Muradian et al., 2013; Vatn, 2010) since the economic incentive tends to displace other sources of motivation. In the particular case of PES, the problem will be that the incentives could be targeting mainly hedonic values and gain

considerations that will ultimately not be effective once the payment is over, as noted by Steg et al. (2014b). To further understand how payment is affecting all values we extend this behavioral concern to understanding the underlying characteristics that motivate pro-environmental behaviors through the understanding of values, beliefs and norms.

In the context of this study *beliefs* "are measures of awareness of consequences" (Dietz, 2015 p. 16) of human actions. They consider the concerns about man-made environmental risks such as climate change and the potential disasters associated with nuclear power. These beliefs are measured through the New Environmental Paradigm (NEP) scale, which measures primitive beliefs about the relationship between human beings and their environments and assumes that human survival is dependent on a healthy global environment (Dunlap, 2008). The NEP scale contains 15 items: 12 manifest the future or present state of the biophysical environment, including humanity's relationship with nature and characteristics of the biophysical world itself. The other three make assertions about relative human rights to nature. Stern et al., (1998) argue that the NEP measures worldview – a set of generalized beliefs about human-environment relations and not values, and they claim that those beliefs are highly correlated to awareness of consequences of environmental problems. Therefore beliefs become the middle ground between *values,* which represent the deepest most stable guiding principles, and *norms,* which consist of what is expected from people surrounding you, which is constantly in flux and therefore less stable. For this research, beliefs were used to measure that middle ground of principles that guide decision-making of pro-environmental behavior. This measure was used to better understand at what point on this scale of principles is it that PES may be having, or not, an effect on people to affect behavior. The version of the NEP we used was modified to capture beliefs as it was also used by Clements et al., (2015) and is known to correlate with pro-environmental attitudes, behavioral intentions and policy preferences. It has five items (Dietz et al.,, 2007; Dietz, 2015b).

According to Schwartz (1977), "social norms consist of expectations, obligations, and sanctions currently anchored in social groups. The expectations, obligations, and sanctions which constitute personal norms, by contrast, while originating in social interaction, are currently anchored in the self"(p. 223). Schwartz designed a *norm activation model* that seeks to describe the personal norms under which we take altruistic action. Schwartz (1977) notes that altruism can only be explained in the interaction between values and norms. In the norm activation model it is clear that only when a consequence will affect an object that is highly valued (species, community, person) will a norm be

activated and the "ought to be" happens. For the current research we will measure descriptive norms in the form of behavioral expectations of individuals about the community. Through exploring norms we understand what people believe "ought' to happen" in the context of a pro-environmental activity. The understanding of these descriptive norms opens a window to understanding how the aggregation of values and beliefs is expressed in what we expect to happen in our society.

In terms of behavior, most of the measurements to date have been done through self-reported behavior and behavioral intention(Johansson et al., 2013; Oreget al., 2006; Wynveen et al., 2015), donation to an environmental NGO (Clements et al., 2015) and in one study, the authors linked a natural experiment to attitudinal factors and external conditions (Guagnano et al., 1995). These authors took self-reported recycling behavior controlling for who had been given a recycling bin. The authors of that study referred to this behavior as convenient and of intermediate level of difficulty because the provision of the bins makes recycling more convenient; the authors were not sure if the effects they found would hold with behaviors that were easier or harder.

2.2.2 The values-beliefs-norms (VBN) lens and some applications

Drawing from theoretical work on values and norm-activation processes and their previous work on environmental behavior (Stern et al., 1994), Stern et al., (1999) proposed the values-beliefs-norms (VBN) theory. As shown in Figure 2-1, the VBN theory is a causal model that moves from stable elements such as values into focused beliefs and norms. It follows the norm activation model from Schwartz (1977). Hence, when a person holds as valuable the well-being of other individuals or communities – altruistic values – one will be concerned for anything that can threaten other individuals or communities' well-being; or if the person cares for other species – biospheric values – then she will be concerned about environmental conditions that might threaten those species (Stern, 2000).

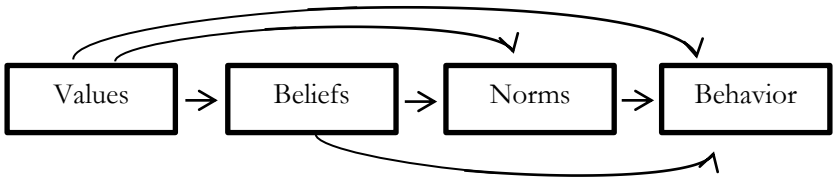

Figure 2-1: Graph: Upon conversation with dr. Aaron McCright this model represents the VBN theory, where the different items affect each other and go from most stable to most dynamic.

The VBN theory uses measures of variables from moral norm activation theory, personal values with the modifications of the Schwartz scale by Stern et al. (1995) to harness environmental values and the NEP scale to measure beliefs and environmental behavior from self-reports. This model has been tested to be a strong predictor of environmentalism outside activism activities in the following categories: environmental citizenship, private-sphere behavior, and policy support (willingness to sacrifice) (Stern et al., 1999).

The VBN has been used in different contexts to find or predict pro-environmental behavior. Some studies found that norms helped predict pro-environmental behavior the most in the case while the values and beliefs stayed very similar across the groups (Johansson et al., 2013). Other studies found that the pro-environmental behavior is indeed a result of causal relationship of VBN(Clements et al., 2015; Ibtissem, 2010; Wynveen et al., 2015).

2.3. Behavioral concerns related to the implementation of PES

Some authors express concern that incentives such as PES could lead to a reduction in motivations to protect the resource once financial incentives dissipate (Arild Vatn, 2010). In particular, economic incentives may crowd-out intrinsic motivations to protect the environment from those users of natural resources receiving the incentive (Cardenas et al., 2002; Kerr et al., 2014; Lopez et al., 2013; Muradian et al., 2013). Empirical evidence finds that providing payments may change peoples' mindset as Kerr et al., (2012) have noted. In their study, the authors found in a natural experiment that the introduction of payment changes the mindset of the individuals from a social market to a monetary market mindset. At which point, the payments are now encouraging them to make decisions based on market rather than their intrinsic motivations.

Experimental evidence suggests that "economic incentives can impact intrinsic motivations for engaging in biodiversity and ecosystem conservation" (Rode et al., 2014). In the review of different studies using different kinds of economic experiments by Rode et al., the authors found that economic incentives may create crowding out by changing people's mindsets into utilitarian and monetary motivations. The authors conclude that when "intrinsic motivations to engage in biodiversity and ecosystem conservation play an important role"(Rode et al., 2014), agencies need to be cautious when faced with the alternative of providing economic incentives. Since people appear to have trouble holding both sources of motivation at the same time, and that the financial motivation seems to dominate when both are put next to each other.

Another type of crowding out may occur when not all the direct users or community members living nearby get payment, which is always the case in PES schemes. Alpizar et al., (2012) explore this scenario in an economic experiment[10] and found that when participants were excluded based on their past pro-social behavior (meaning that those who were contributing less were subsidized by those contributing more) they chose to act less pro-socially, harming the benefits that the community could obtain from this scenario. The authors found that the payment may generate a negative spillover in the actions of those excluded from the incentive. The study concludes that an incentive based program might exclude previously pro-environment people. It also stresses the fact that a clear understanding of how participants are chosen or have access to the programs will help prevent or minimize the possible spillover effects.

Asensio et al., (2015) investigate different ways to reduce residential energy consumption. The authors compare traditional cost-based information strategies provided to public health information disclosures regarding the metrics of reduced air pollution emissions. The authors found that those who received the health disclosures saved on energy consumption, while those who received the cost-based information increased their consumption. This results show how showing the dollar amount could be signaling a transaction that is only about self-interest, while when including the health information the decision becomes driven by altruism (Dietz, 2015a).

[10] The authors used a dictator game, and they added one regulator per ten dictators, in the final round the regulator chose one of three rules to determine which dictators would receive the incentive.

2.4. Site Description

The program Ganaderia Colombiana Sostenible (GCS) is a national program that seeks to achieve the sustainable use of natural resources in cattle ranches within the program areas through the use of biodiversity friendly silvopastoral systems[11] that allow for greater conservation of biodiversity and the reduction of degraded soils. Silvopastoral systems help protect soils as well as increasing biodiversity. The program seeks to 1) improve productivity and optimize the cost structure of cattle ranching, and 2) develop connectivity corridors in agricultural landscapes. Technical assistance is being provided in all regions of the program for the improvement of productivity through silvopastoral systems. For the development of corridors and maintenance of connectivity to protect biodiversity a PES scheme was developed that seeks, within the most critical areas of the program, to incentivize connectivity through the provision of an economic incentive that pays for biodiversity protection. This scheme protects natural covers and incentivizes the conversion of land use from grass-only covered fields into silvopastoral systems.

The beneficiaries were those who responded to a call done in the areas deemed most critical within the five areas where the program operates and whose applications were accepted. Those who were accepted could either receive only Technical assistance (TA) for being in the general area, or payment for environmental services (PES) and TA if their property was inside or touching the designated biodiversity corridors. The acceptance to the program was dependent on the submission and revision of a long list of documents that included land tenure certificate and a criminal background check among other (see Table 2-2).

Table 2-2: Documents required for the application to GCS.

Document	Description
Form with basic information[1]	Personal information of the rancher (name, I.D. number, address, phone number, among other)
	Description of the land (location within the shire (district), municipality and department; total area in hectares)
	Description of the area of the ranch allocated to cattle ranching (specifically the pasture areas in hectares)

[11] Ranching systems that include trees and bushes

Table 2-2 (cont'd)

<table>
<tr><td rowspan="5"></td><td colspan="2">Description of the areas allocated to uses other than cattle ranching (such as areas of forest, agroforestry systems and/or crops)</td></tr>
<tr><td colspan="2">Information regarding land tenure (the cattle rancher must indicate whether he/she is owner, possessor in good faith or holder)</td></tr>
<tr><td rowspan="2">Information on the family living in the land:</td><td>Number of people living in the ranch and their relation to the rancher</td></tr>
<tr><td>Age and education level of each individual</td></tr>
<tr><td>Information about the ranch</td><td>Number of cattle heads</td></tr>
<tr><td></td><td></td><td>Type of farming: beef, milk and dual purpose</td></tr>
<tr><td colspan="3">Copy of I.D card of all the land owners, holders or possessors.</td></tr>
<tr><td colspan="3">Criminal background check</td></tr>
<tr><td colspan="3">Certificate of free and clear title</td></tr>
<tr><td colspan="3">Copy of legal documents that demonstrate the ranchers' condition of owner, good faith holder or possessor of the premises.</td></tr>
<tr><td colspan="3">Copy of the certificate of vaccination against foot-and-mouth-disease.</td></tr>
<tr><td colspan="3">[1]By signing to the form the rancher certifies that the ranch currently.
* Has no judicial disputes or claims.
* The main economic activity of the ranch is cattle.
* Has not deforested more than 5% of the forest in its premises in the last three years.</td></tr>
</table>

These many documents needed and the time it took to review them may have discouraged some to participate. And in doing so it may allow for some self-selection.

This project is implemented in the coffee eco-region of Colombia, one of the five regions where the program is operating (Lower Magdalena, Cesar river Valley, Boyacá & Santander, and the Orinoco foothills) which includes the departments of Quindío, Risaralda, Caldas, Valle del Cauca and Tolima. Due to security concerns due to guerrilla and paramilitary groups in the area, certain municipalities

of Valle del Cauca were not approached (Obando and Tulua). In the coffee eco-region the program has 394 beneficiaries of technical assistance and 288 beneficiaries of PES (who also receive technical assistance).

2.5. Methods

In order to better understand the program and its multiple stakeholders' perceptions, we carried out semi-structured interviews with managers of the program in the study area, extension personnel, ranchers and managers of partner organizations. These interviews explored the challenges associated with program implementation, the experience of participating in the program and the roles each person had to play in the design and implementation of GCS. These interviews resulted in a comprehensive understanding of the program at all operational levels.

For the study, we used purposive sampling to survey three groups of ranchers: beneficiaries of PES and technical assistance (PES), beneficiaries of technical assistance (TA) only, and a control group that was unrelated to GCS (CON). Initial contact with the three groups was made with the assistance of staff members of GCS and local field assistants who knew and worked with ranchers in the region (both in and out of the confines of the program). During these conversations, individuals were informed about our study with cattle ranchers in the region and were asked if they were interested in participating in the study. If they expressed interest then the person making the contact requested their authorization to provide us their names and contact information. We then proceeded to contact them and scheduled an appointment to conduct the survey.

During the individual meetings, we began the conversation by describing the project and then went through the consent form. It was crucial to emphasize that the information and data collected would not be individually shared with program officials even though the initial contact was sometimes made with their help.

Our survey was designed to assess the environmental Values Beliefs and Norms, the socioeconomic characteristics of the population and the subjects' understanding of the program. A total of 150 surveys were obtained that included 50 ranchers of each of the three groups.

This survey (see appendix) starts with the short version of the Schwartz protocol designed by Stern et al. (1998), and focuses on environmental values. The protocol establishes five categories essential

for understanding environmental attitudes and behavior: openness to change, traditional[12] values, egoistic values, biospheric altruism[13] and humanistic altruism. This section includes 15 items clustered into the five values (three items per value cluster) that are responded to on a 5 point Likert scale. Next is a section measuring environmental beliefs. These were measured through the New Environmental Paradigm (NEP) scale, taking into account basic beliefs about the relationship between human beings and their environment. The NEP consists of 5 items measured in a five-point Likert scale. To measure norms we used the definition of personal norms by Schwartz (1977) consisting of expectations, obligations and sanctions anchored to the self. The particular type of norm measured was a descriptive norm. These norms were measured by asking respondents about the expected participation of their communities in a pro-environmental activity.

Additionally, we included a section with general socioeconomic and environmental questions. For the TA and PES groups we also included questions regarding the program and its benefits. These questions seek to better understand the context within which ranchers are making decisions about managing their land.

While measuring behavior we followed different stages from hypothetical action to actual behavior measures through a natural experiment. Kerr et al., (2012) used a similar experiment in which they reported concrete action invitation responses and real participation but they do not measure hypothetical behavior or an intermediate concrete behavior. For the hypothetical action, we asked participants the following question "If someone else invited 10 people from your community to plant trees in a site that everyone uses, such as, for example, a school, or the _____[14], how many of those 10 people do you think would participate?" This question was posed without knowledge about whether the activity was going to be conducted or not. For each community we chose a site that was common and accessible, such as schools, community homes for the elderly, garbage dump sites, river banks or road sides. The location was explicitly a place that provides a public good to the community and not a private place. This was done to assure that all the community would benefit from it and not just one individual in particular. Since the response to this

[12] Called conservationist values in the Schwartz literature but due to the context of these measures traditional values is less confusing.
[13] This short version of the Schwartz protocol opens up the value cluster of transcendence values from the original Schwartz protocol into biospheric and humanistic altruism.
[14] Left blank to fit the place where the actual activity would take place when this was not a school. This could be a communal house for the elderly, a municipal waste management plant or an actual school.

question may be influenced by the values and beliefs questions, in half of the surveys we asked this question before measuring values and beliefs and in the other half we included it at the end of the survey.

In addition to the hypothetical question, we also measured intended behavior. To do that, after finishing the survey, the respondent was invited to participate in the actual activity mentioned in the hypothetical question. The invitation said: "We are going to plant seed beds of native species at the school[15]. You are invited to participate next ____[16] between ___ AM and ___ PM. We will supply the seeds, soil and tools needed to plant them. You are invited to accompany us." In the invitation, it was also mentioned that we were going to provide a snack during the activity. The responses to this question were either yes or no. After this invitation, those who agreed to participate were informed that we would call to remind them at least three days before the activity.

The third stage applied only to those respondents who had positively responded to the invitation. In this stage, we telephoned all the participants and invited them to an activity that would happen the following weekend. All the details about the location and time of the activity were also provided. At the end of the call participants indicated whether they were going to participate, not participate or maybe participate in the activity.

The last stage was the natural experiment, similar to what Kerr et al., (2012) reported. This consisted in tallying the actual number of participants that were present for and participated in the activity.

Finally we used a multinomial logistic regression to explore how being in a certain group may cause people to be a certain way, particularly in terms of values. This was used to explore how some individual characteristics may be affected by the kind of beneficiary an individual becomes.

2.5.1 Pilot

Through applying both the Stern et al., (1998) short version of the Schwartz protocol and the NEP scale we were faced with the complication of using tools originally designed for developed countries, and used a few times in developing countries mostly in urban areas and transforming them into tools

[15] The site was dependent on which municipality the rancher lived in
[16] Left blank to fill with the date of the event

to be used in a rural area of a developing country. Foreseeing these possible challenges, we conducted a pilot of the different protocols in a region of Colombia with rural dwellers with similar characteristics to the ones in the region where we conducted the research. During the pilot we found that certain concepts within the NEP and the Schwartz protocol needed to be adjusted to the cultural setting. In the original Schwartz protocol there is a statement on loved ones; in the context of Colombia this is referred to more as family, since also family in Colombia is a much wider concept that in places like the US. In the original NEP one statement makes reference to a spaceship; we had to adjust that to talk about scarce resources. These were the kind of adjustments that needed to be done to put context to both protocols.

2.5.2 Sample characteristics

We surveyed 150 participants, divided in three different groups. The average age of the respondents was 53.14 years and 82.67% of respondents were male. This is not surprising since cattle ranching is a male-dominated activity in Colombia. Of these participants, 62% considered their financial situation to be average compared to other members of the community. The mean number of years of education was 12, which in the Colombian educational system corresponds to finishing high school and studying one extra year, which happens to be high for rural areas of Colombia.

The respondents had lived in the region on average 38.42 years, and held their land on average 26.22 years. They had worked with cattle on average 28.85 years. Almost all ranchers, 96.67% of them, were owners of the land which had an average size of 61.77 ha. This size according to the program is considered a medium sized ranch in the region. The ranchers had an average of 79.07 heads of cattle and 48.67% of the sampled ranchers were also agricultural farmers.

2.6. Results

In this section we present our results. First we explore the socioeconomic characteristics of the sample and following that we explore the values, beliefs and norms within the sample and across the three groups. Finally we discuss the results of the natural experiment in relationship to the groups and the sample in general.

Table 2-3 presents some general characteristics of the three ranchers' groups and in Table 2-4 we document the p-values of the comparisons between each group against the other two for each

characteristic. The sample had only 26 women (17.3% of the total sample) -- this is not surprising since culturally, cattle ranching is considered a male-dominated activity. The group that had the least number of women was the control with 4 women out of the 50 individuals (8% of the CON group sample) surveyed, followed by the TA group with 10 women out of 50 (20% of the TA group sample). Finally PES had 12 women out of the 50 (24% of the PES group sample). Another important characteristic is that almost half of the individuals surveyed (48.67%) were also farmers growing crops as opposed to just ranchers. The PES group had the largest number of such farmers (52%), followed by the CON (48%) and finally the TA group (46%).

We found that most of the beneficiaries of PES are older (p= 0.05) with an average age of 57 years, compared to those in the other two groups (TA and CON), while the control group is significantly younger (p= 0.05), with an average age of 49.7 years. On the other hand those receiving technical assistance have a significantly (p= 0.001) higher number of years of education, 14.8 years, compared to the other two groups. Those in the control group have significantly fewer years of education (p= 0.05) compared to the other two groups. The last significant difference between these groups, is that those benefiting from the PES scheme are the ones that have been in the region the longest time (p=0.1).

Table 2-3: Characteristics of the three rancher groups.

		TA	CON	PES	General
Age	Average	52.82	49.72	56.96	53.17
	Median	53	50	56	53
Education	Average	14.79	9.80	11.35	11.98
	Median	16	11	13	14
Land owned (Hectares)	Average	67.42	36.34	80.37	62
	Median	31	24	27.5	28
Years in the region	Average	36.67	36.22	42.36	38.42
	Median	40	35	44.5	40
Years working with cattle	Average	25.42	27.52	31.84	28.26
	Median	21.5	25.5	27.5	25
Years owning current farm	Average	24.29	27.74	26.62	26.22
	Median	21	25	21.5	23.5
Cattle heads owned by household	Average	79.96	50.61224	106.08	78.88
	Median	50	23	24	28

Table 2-4: t-tests comparing group characteristics.

		TA	CON	PES
Age	t-test	0.8347	0.0249	0.0135
Education	t-test	0.0000*	0.0012*	0.3588
Land owned (Hectares)	t-test	0.6867	0.1080	0.2333
Years in the region	t-test	0.4673	0.3604	0.0995
Years working with cattle	t-test	0.1930	0.7352	0.1003
Years owning current farm	t-test	0.3478	0.4581	0.8444
Cattle head owned by household	t-test	0.9668	0.1864	0.2032
* Significant with Bonferroni correction[17] -The Bonferroni correction requires the p-value to be equal or less than 0.005 to achieve a significance level of 0.1				

Before analyzing the value cluster, a value cluster is group of items that measure a value, we measured alpha reliabilities (see table 2-5) and found that several value clusters are at above 0.7, meaning that the scales have reasonable reliability thus indicating the items are tapping the same underlying construct. The only clusters that showed lower alphas were the traditional and egoistic values but since these scales have been widely used worldwide we can assume interconnectedness.

Table 2-5: Alpha reliability table of value clusters.

Item	Value cluster	Alpha
humanistic altruism		0.7251
V_1a	Equality, equal opportunities for everyone	
V_1i	Social justice, correcting injustice, caring for the weak	
V_1o	World peace, freedom from war and conflict	
Biospheric altruism		0.7953
V_1b	Protecting the environment, conserving nature	
V_1f	Respect for the land, harmony with other species	
V_1k	Unity with nature, integration with nature	
Traditional		0.3945
V_1c	Honoring parents and elders, showing respect	
V_1g	Family stability, being sure of the family's support	

[17] The Bonferroni correction is included to take into account the possibility that by running t-tests so many times some significances may be the result of randomness.

Table 2-5 (cont'd)

V_1l	Having self-discipline, self-control, resisting temptations	
Openness to change		0.6226
V_1d	An interesting life, full of challenges, novelty and change	
V_1h	An exciting life, stimulating experiences	
V_1m	Curiosity, interest in everything, exploring	
Egoistic		0.5485
V_1e	Authority, the right to lead or direct	
V_1j	Power, control over others, domination of others	
V_1n	Wealth, material possessions, money	

To better understand how VBN are structured in the three groups, first we compared the structure of the five value clusters (egoistic values, humanistic altruism, biospheric altruism, traditionalist values and openness to change) across the three groups, as showed in figure 2-2.

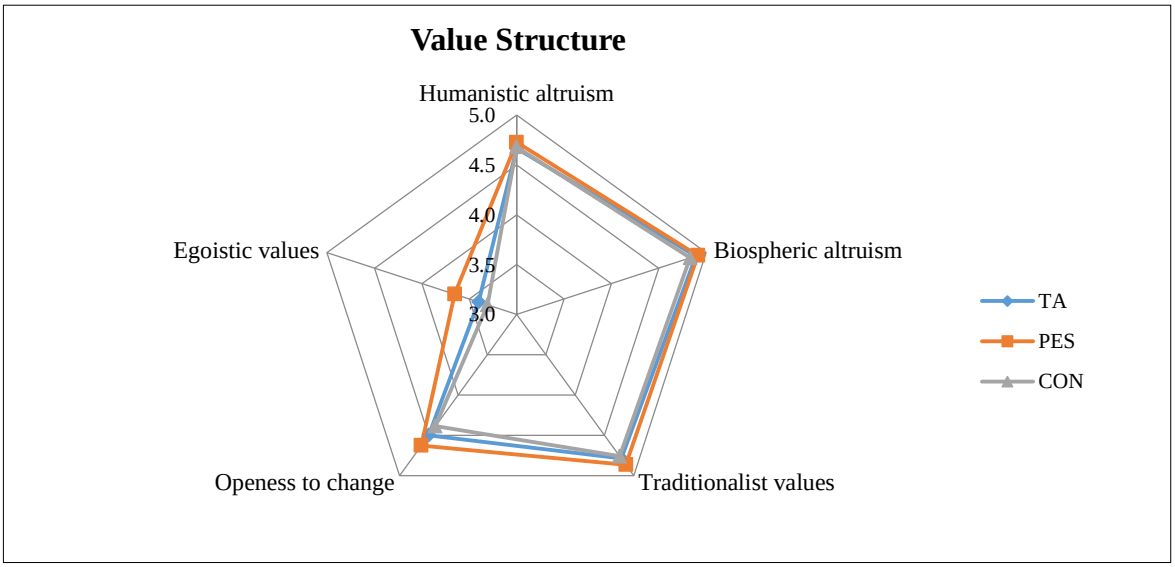

Figure 2-2: Graph: Comparison of value structure between groups.

As shown in Figure 2-2, we found that all three groups have some similar patterns. However, we also found some disparities. It is interesting that all groups portray high levels of openness to change as well as high traditionalist values. This seems counterintuitive, but it reflects a characteristic of this region that has been reported in the literature (Gutiérrez de Pineda, 1996). Individuals from this region are known for their traditionalism inside the household explained in part by their devoutness

to the Catholic faith, paired with an incredible openness outside of the household to be entrepreneurs and forward looking. This area is also characterized by the amount of environmental work that has been done in raising awareness in the communities for the need to protect their environment, in particular with respect to the protection of water sources, and to use ecotourism as an alternative strategy for natural resources use. This is reflected in the high levels of biospheric altruism paired with high levels of humanistic altruism in their responses.

Although the three groups follow the general characteristics (Table 2-3), we found interesting differences regarding participants in terms of values (see Table 2-4). First, we found that those who are benefiting from the PES scored significantly higher in the egoistic values cluster than the other two groups (p=0.018), while those in the control group scored significantly lower (p=0.085) than the other two groups in this same value cluster (egoistic values). This pattern was repeated for openness to change where those in the PES group had significantly higher scores (p= 0.043) compared to the other two, while those in the control group had significantly lower scores (p=0.052) in this same cluster compared to the other two groups (PES and TA groups). For the beneficiaries of PES their scores in traditional values (p=0.086) were higher than those in the other two groups. To ensure the robustness of the results we also ran the Wilcoxon test (Table 2-6), obtaining the same results.

Table 2-6: t-test differences in values.

VBN	Test	PES	TA	CON
Egoistic values	Average	3.65	3.40	3.31
	t-test	0.0184	0.5333	0.0853
	Wilcoxon	0.0082	0.4181	0.0668
Humanistic Altruism	Average	4.73	4.67	4.68
	t-test	0.5520	0.6827	0.8526
	Wilcoxon	0.9118	0.9190	0.9928
Biospheric Altruism	Average	4.91	4.89	4.83
	t-test	0.3292	0.6967	0.1712
	Wilcoxon	0.1398	0.7788	0.0789
Traditional values	Average	4.87	4.79	4.76
	t-test	0.0864	0.6257	0.2217
	Wilcoxon	0.0203	0.3071	0.1937
Openness to change	Average	4.63	4.50	4.39
	T-test	0.0434	0.9418	0.0517
	Wilcoxon	0.0805	0.8108	0.0469

* Significant with Bonferroni correction[18] -The Bonferroni correction requires the p-value to be equal or less than 0.007 to achieve a significance level of 0.1

[18] The Bonferroni correction is included to take into account the possibility that by running t-tests so many times some significance's may be the result of randomness.

On the environmental beliefs no significant difference was found across the three groups (Table 2-7).

Table 2-7: t-test differences in beliefs.

NEP	TA	CON	PES	General
Average	4.04	4.12	3.96	4.04
t-test	1	0.3219	0.3219	-
Wilcoxon	0.8318	0.3313	0.4477	-

In the case of norms, those in the TA group had significantly lower numbers of expected attendants to the event (p= 0.087) compared to the other two groups, however we do not have an explanation for that result (Table 2-8).

Table 2-8: t-test differences in norms.

Norms	TA	CON	PES	General
average	4.1	4.745	5.14	4.660
t-test	0.1423	0.0866	0.8052	-
Wilcoxon	0.1403	0.0668	0.7158	-

To summarize, a general characterization of PES beneficiaries is that on average they are older than those receiving technical assistance and those in the control group. They also have lived in the region longer. In general we found that all groups were very open to change as well as very high in traditionalist values. PES beneficiaries tend to have higher egoistic values and openness to change than the other two groups. No differences were found with respect to beliefs, and the TA group seemed to have norms with lower expectations of attendance compared to the other two groups.

2.6.1 Measuring Behavior in four steps: A Natural experiment

Table 2-6 and Figure 2-3 present the results of the behavior at each of the four stages we measure it. In general, we can see that when commitment increases we lose respondent participation (see table 2-9). During the first stage of hypothetical behavior (hypothetical invitation) over 91.33% of the participants responded they would attend the event. Most of the individuals who said they would go belonged to the TA and PES group (34.31% and 33.58% respectably) followed by the CON group

(32.12%). Once we moved to the concrete action invitation (intended behavior) the commitment became real and then the percentage of participants who responded yes to the invitation decreased to 71.33%. In this case most individuals who said yes were part of the CON group (39.25%, followed by the PES group (35.51%) and finally the TA group (25.3%). Moving to the intermediate concrete behavior (telephone confirmation) we only approached those who had said yes to the concrete action invitation. The percentage of individuals who responded either "yes" or "maybe" was similar to the previous stage at 73.83% (69.16% yes and 4.67% maybe). This time the ones who gave a positive response (yes or maybe) were mostly from the PES group (48.89%) followed by the CON group (38.78 %) and finally members of the TA group (29.32%). Finally when the individuals are faced with the natural experiment (concrete action) 17.9% of the respondents attended the event (see figure 2-3). Most of these belonged to the PES group (46.67%), followed by the TA group (33.33%) and lastly the CON group (20%).

Table 2-9: Responses at the four stages of the behavioral experiment.

Treatment		Hypothetic action		Concrete action invitation		Intermediate concrete behavior				Natural Experiment	
	response	Yes	No	yes	No	Yes	Maybe	No	Did not answer	Came	Did not come
All	response	137	13	107	43	74	5	15	13	15	79
	percentage	91.33	8.67	71.33	28.67	69.16	4.67	14.02	12.15	15.96	84.04
TA	response	47	3	27	23	18	0	4	5	5	13
	percentage	94.00	6.00	54.00	46.00	66.67	0.00	14.81	18.52	27.78	72.22
PES	response	46	4	38	12	31	0	3	4	7	24
	percentage	92.00	8.00	76.00	24.00	81.58	0.00	7.89	10.53	27.78	72.22
CON	response	44	6	42	8	25	5	8	4	3	28
	percentage	88.00	12.00	84.00	16.00	59.52	11.90	19.05	9.52	9.68	90.32

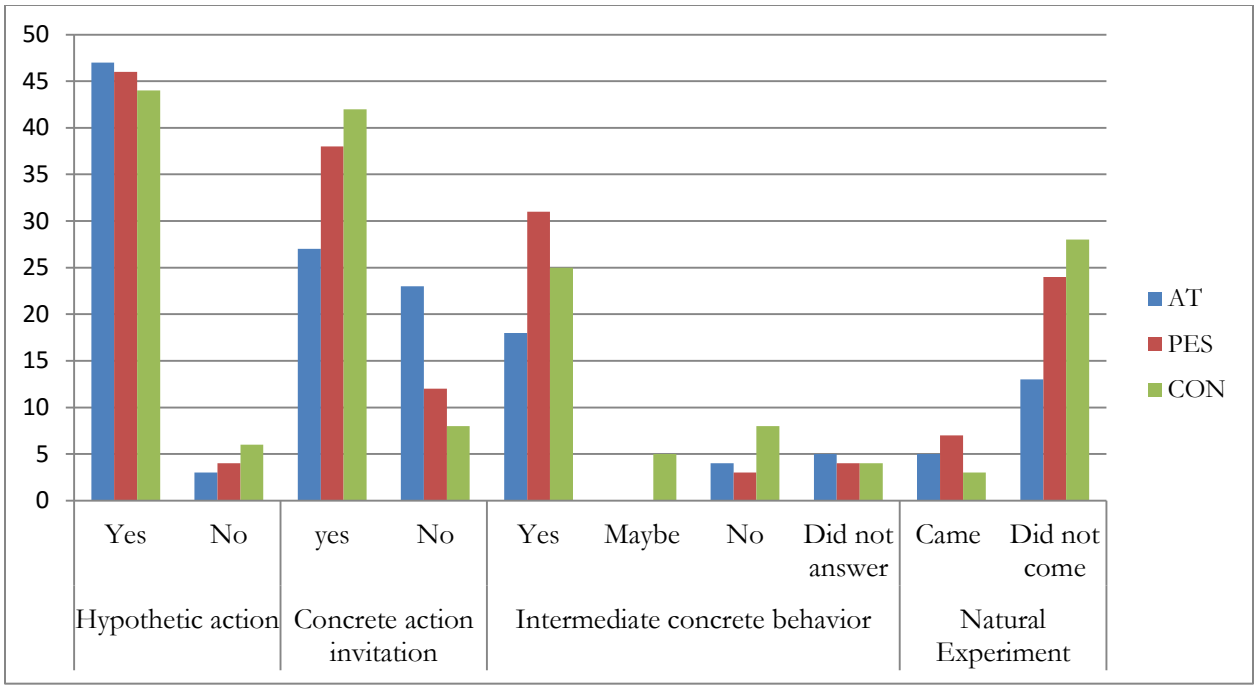

Figure 2-3: Graph: Responses to the four stages of behavior in participant numbers

When comparing those respondents who decided to attend against those who did not attend we find that those who attended were significantly older than those who did not attend (an average of 59.4 years, p-value= 0.0624) and had lived in the region for significantly longer time (an average of 47.6 years, p-value=0.068). No differences were found in any of the items of VBN, nor in the association with one of the three studied groups, but the difference in these two characteristics (age and residency) may mean that some of the pro-environmental behavior can be driven by the person's relation to the land and their length of experiences with it.

2.6.2 PES and Values, Beliefs and Norms

We used a multinomial logistic regression to better comprehend how Values-Beliefs-Norms may be affected depending on the kind of beneficiary a person is (either PES or TA) in comparison to the control group (those who are not beneficiaries). In Model 1 (see Table 2-10) we find that beliefs are significant. Every unit increase on a persons NEP score reduces the odds, compared with the control, of being in the PES treatment by 48%, keeping the other variables constant. This means that those with higher scores in the NEP tend to be part of the Control group when compared with those in the PES group. For those in TA there is no significance when controlling for the VBN alone.

Model 2 (see Table 2-10) is based on Model 1 but we included the variables gender, age, years of education and years living in the region. Once these variables are included for the PES group gender and age are significant at the 95% level, and beliefs continue to be significant at the 10% level. The significance of these variables is dependent upon keeping all other variables constant. In the case of technical assistance (TA), beliefs are not significant but the newly included variables gender, age and years of education are. For the TA group age was significant at the 90% level, gender was significant at the 95% level and years of education at the 99%. In the case of beliefs for the PES group, this means that every unit increase in the scale of beliefs lowers the odds of being in the PES treatment--52% relative to the control group, this variable was not significant for the TA group. The odds of females being in the PES group, relative to the control group, are 445% higher than males. The odds of females being in the TA group relative to being in the control group are 385% higher than the odds of males. In the case of age we find that for every year increase in age the odds of being in the PES group relative to the control group are 5% higher, while the odds of being in the TA group relative to the control group increase by 0.4%. For PES years of education was not significant. In the case of TA for every year increase of education the odds of being in the TA group relative to the control group are 19% higher keeping all other variables constant.

Table 2-10: Multinomial logistic regression on beneficiary groups (TA and PES) using the CON group as a reference group.

	Model 1		Model 2	
	rrr	Std. Err	rrr	Std. Err
PES				
Humanistic Altruistic Values	0.60	(0.32)	0.56	(0.31)
Biospheric Altruistic Values	2.21	(2.23)	1.35	(1.48)
traditional Values	1.24	(1.20)	1.34	(1.42)
Openness to Change Values	2.20	(1.21)	2.40	(1.50)
Egotistical Values	1.55	(0.50)	1.45	(0.51)
Beliefs	0.52*	(0.18)	0.48*	(0.19)
Norms	1.06	(0.08)	0.99	(0.09)
Gender			5.45**	(3.82)

Table 2-10 (cont'd)

Age			1.05**	(0.02)
Years of education			1.06	(0.05)
Years in the region			0.99	(0.01)
Constant	0.01	(0.02)	0.00	(0.02)
TA				
Humanistic Altruistic Values	0.73	(0.38)	0.61	(0.33)
Biospheric Altruistic Values	2.16	(2.01)	1.17	(1.15)
traditional Values	0.68	(0.60)	0.97	(0.95)
Openness to Change Values	1.48	(0.75)	1.45	(0.82)
Egotistical Values	1.17	(0.36)	1.00	(0.34)
Beliefs	0.65	(0.23)	0.54	(0.22)
Norms	0.93	(0.07)	0.88	(0.08)
Gender			4.85**	(3.44)
Age			1.04**	(0.02)
Years of education			1.19****	(0.06)
Years in the region			0.99	(0.01)
Constant	0.56	(2.10)	0.41	(1.57)
CON (Reference)				
Pseudo R2	0.0497		0.1433**	
Observations	147		145	

**** p<0.001, *** p<0.01, ** p<0.05, * p<0.1 rrr: refers to relative risk ratio

2.7. Discussion

In this paper we use the Values, Beliefs and Norm measures to address the question of crowding out in the context of PES. The Values, Beliefs and Norm framework and the crowding out theory are instrumental to comprehend the foundations of what motivates or not pro-environmental behavior within the context of Ganadería Colombiana Sostenible and other PES schemes across the world.

The three groups we analyzed (PES, TA and CON) are formed by ranchers with similar acreage that have been working with cattle for similar amounts of time, and have a similar cattle herd size. In spite of the effort made to get similar groups, we found that those who belong to the TA group have more years of education than the rest, while those in the CON group have less. On the other hand, those who belong to the PES group are older compared to the rest, while those in the CON group are younger. And finally, those who are in the PES group are the ones that have been in the region the longest.

On the measures of values we found higher levels of egoistic values, traditional values, and openness to change for individuals in the PES group. This result is very interesting and it requires further exploration because with the information gathered we can only report the difference but we cannot affirm if the PES program is creating these differences or if the ranchers with these characteristics are more likely to join the program, nonetheless the clear characteristics of the program may be reducing the chances of self-selection. The fact that the PES group is also the oldest group explains why they may have had the highest levels of traditional values. On the other hand, the CON group was found to have lower egoistic values as well as openness to change. The TA group does not display any significant difference within the values compared to the other groups (PES and CON), creating a sense of gradient from CON to PES in terms of the egoistic values and the openness to change. This difference in egoistic values measures for the PES group has great implications on what could be a crowding out effect on the pro-environmental behavior of individuals. A question that is important to answer is whether or not the PES may be crowding out people's values, and how those changes might be translating into less pro-environmental behavior outside the limits of the program's contract, assuming that they are complying to it. It is also possible that since PES beneficiaries are older and more traditional, they may also be less likely to be seduced by the monetary payments, and thus less likely to have such incentives crowd out their traditional pro-environmental values.

The high levels of openness to change in our sample may explain why these particular individuals could be agreeing to participate in this program that entails a change in the paradigms of cattle ranching in Colombia.

It is interesting that in beliefs we did not find significant differences amongst the groups, yet every unit increase in the NEP scale lowers the odds of an individual being part of the PES group by 52%, compared to the control group. It makes us wonder if with a larger sample we could find more detailed differences and trends that could lead to seeing that does in the PES group in fact has scores lower on the NEP scale.

On norms we found that the TA group had the lowest expectations of pro-environmental behavior; this group also had the lowest attendance rate in the natural experiment. There was a direct relationship between the behavioral expectations and the actual attending rate of the groups. It is interesting to see that those who are receiving the technical assistance, which includes group meetings and sometimes requires the individual to help their neighbor, are the ones that had the lowest expectation of attendance to the activity (an average expectation of 4 attendees). It is possible that for this group since they did not know who else from the community was going to attend the activity did not create a sense of obligation to the community, but also that since they do not get a payment, they feel that maybe they do not have to support any activity that in one way or another is supported by the program.

Most of the participants who showed up for the natural experiment belonged to the PES group (46.67%). This result seems to contradict the result that we found with respect to egoist values, but in fact we do not think that is the case. Although we made a great effort to maintain a clear distance from the program it was those within the program that felt the need to be helpful and attend the activity, maybe because they want to have some "reputation" with the program. But also the fact that those in the PES group have spent more time in the region might make them think about the activity more in terms of personal gain, as well as social capital which can be used later on.

On the other hand the CON by not having a direct relationship with the program did not feel the obligation of joining in. Also, they are the ones that have spent the least amount of years in the region and the youngest group.

Clements et al., (2015) found NEP to be a significant variable in intended behavior much more than concrete behavior. In our case we did not find significant differences in the NEP across groups, yet the variable is significant in our model to predict who is a member of the PES group. It is interesting to see how this variable was also significant for members of the PES group who had the highest score in intermediate intended behavior and the second most with the most atendance in the concrete behavior.

The attendance to our activity is consistent with what Kerr et al., (2012) reported. For individuals who were not offered payment which is similar to what we did, 54% agreed to go to the activity. For our activity 71% agreed to go. In their study 25% went to the activity while in ours 16% went. Furthermore the results of this experiment support what others have found that there is a gap, i.e. ann overestimate, between what people say they are willing to do and what they actually do (Clements et al., 2015; Kerr et al., 2014).

2.8 Conclusion

This paper provides new results with respect to the use of the values, beliefs and norms measures to comprehend crowding out behavior in the context of PES. As stated in the introduction, we measure crowding out not in terms of outcomes but through the foundation of what motivates individuals.

We found interesting trends where members of the PES group are more egoistic and open to change as well as more traditional than the other two groups. It is possible that no matter the direction of this relationship these values are a signal of motivational crowding out which is contrary to the objectives of the program. We must ask if individuals with high levels of egoistic values are self-selecting themselves to be part of the PES, which will make sense since the program is offering money to do some changes in their ranches that will benefit them. If they are self-selecting then we must think about what that means in terms of expected behavior from them, and ask if their membership is exacerbating the difference between the PES group and the rest through the payments and in doing so increasing the egoistic values of the beneficiaries of PES. If this is not a self-selection process and this program is making individuals egoistic then this paper further supports the motivational crowding out theory that the incentives of the program may be displacing the social and personal sources of motivation to act in a pro-environmental manner.

We are aware that our results leave us with as many questions as answers. But it opens the door to why we need to look further at behavior in payment for environmental services schemes through the lens of Values Beliefs and Norms. For future research we conclude that it would be useful to get a bigger sample that includes more regions within one country, and see if the value structure differs between regions. Also, it would be useful to do this study in a program that has been running for longer than this one has, to see if the trends found in this paper are also going to appear when we study individuals that have received payments for a longer period, and what happens after the payments have ended—is there a return to pre-PES behaviors, or are the pro-environmental behaviors promoted sustained long after the payments have stopped.

Likewise, it is important to study VBN across PES schemes that will allow researchers to see differences across incentives and identify the foundations of the pro-environmental motivations through the lens of VBN. Future research should also attempt to do this study before, during and after the scheme is put in place. One way of doing this could be to use economic experiments as a proxy to see the effects of before and after the incentive takes place on individuals VBN.

APPENDIX

Table A-1: Questionnaire used to collect data.

Questionnaire B	

The information in italics should not be read to the participant. Instructions: This survey should be orally administered, sitting at a table with the interviewee/respondent. Please write down the answers verbatim. Avoid interpreting or shortening them and make sure they are relevant. Ensure that you ask the questions exactly as they are written, and listen to the response from the subject before offering the written choices. You may ask additional questions to clarify any doubts. Verify that you asked all the questions. Many thanks.

x_pr_1	Site ID:					
x_pr_2	Survey date (dd-mm-yy):		D	M	Y	
x_pr_3	Name of the interviewer:		F	S		
x_pr_4	Survey type:	PSA	AT		Control	

(Instructions to be read to participant) Today we are conducting a survey to understand how people in your community manage and take care of your natural resources. All of your answers are confidential and they will only be available to the members of the research team. We invite you to share your experiences, but if you so wish, you need not answer all the questions.

x_pr_5	Participant ID No.	
in_1	How long have you lived in this region?	
in_2	How long have you lived on this farm?	
in_3	How long have you worked with cattle?	

	Please tell me how important the following are for you:					
	a. Not at all important	b. Slightly important	**c. Somewhat important**	**d. Important**	**e. Very important**	
V_1	a. Equality, equal opportunities for everyone					
	b. Protecting the environment, conserving nature					
	c. Honoring parents and elders, showing respect					
	d. An interesting life, full of challenges, novelty and change					
	e. Authority, the right to lead or direct					
	f. Respect for the land, harmony with other species					
	g. Family stability, being sure of the family's support					
	h. An exciting life, stimulating experiences					
	i. Social justice, correcting injustice, caring for the weak					
	j. Power, control over others, domination of others					
	k. Unity with nature, integration with nature					
	l. Having self-discipline, self-control, resisting temptations					

Table A-1 (cont'd)

V_1	m. Curiosity, interest in everything, exploring	
	n. Wealth, material possessions, money	
	o. World peace, freedom from war and conflict	

B_1	Tell me if you disagree, are uncertain or if you agree with:					
	a. I strongly disagree	b. Disagree	c. I don't know	**d. Agree**	**e. I strongly agree**	
	a. People who talk of the "environmental crisis" faced by humanity have greatly exaggerated. (Environmental crisis means all environmental problems)					
	b. If things continue as they are now, we will very soon suffer a gigantic environmental disaster.					
	c. Human beings are severely abusing the environment.					
	d. Nature's equilibrium is sufficiently strong to resist the impacts caused by the developed (wealthy) countries.					
	e. The Earth has scarce space and resources.					

x_po_het1	An owner has deeds to the land. A possessor does not have a deed, but uses the land as if he were an owner and does not recognize anyone else as owner of the land.		
	Are you or anyone in your household owners or possessors of the land where you keep cattle? (If **yes**, continue with question **x_po_het2**; if **no**, continue with question **x_po_het3**.)		YES__ NO__
x_po_het2	How many hectares of land are owned or held by your household/family? ☺ *(Take care to specify the units; we can convert them later.)*		_____ _ Unit
	2-25 ha	26-100 ha	>100 ha
☹ x_po_het3	If you are not the owner/possessor or holder of the farm, are you the caretaker? **YES=END SURVEY**		
	YES__ NO__		
x_po_het4	How many head of cattle are owned by your household?		
x_po_het5	How many head of cattle graze per hectare?		
x_po_het6	Apart from the cattle, how many other large animals, such as oxen, donkeys, horses or mules are owned by your household?		
x_po_het7	Apart from the cattle, what other medium-sized animals, such as pigs, sheep or goats are owned by your household?		
x_po_agi_1	Are you a farmer? *(If YES, go to question **x_po_agi_2**, otherwise go to question **x_po_Agi_4☒**)*		
x_po_agi_2	Do you have a garden for household consumption?	YES__ NO__	
x_po_agi_3	Apart from the garden for household consumption, what crops do you raise?		
	1.		

Table A-1 (cont'd)

	2.	
	3.	
	4.	
	5.	
	6.	
	7.	
	8.	
	9.	
	10.	
x_po_Agi_br_1	¿Do you have irrigation systems for your crops?	YES__ NO__
x_po_Agi_br_1a	If yes, which ones?	
	1.	
	2.	
	3.	
x_po_Agi_br_2	Do you rotate crops?	YES__ NO__
x_po_Agi_br_2a	If yes, how often?	
x_po_Agi_br_3	Do you have agroforestry crops?	YES__ NO__
☒ x_po_Agi_br_4	Do you have shade crops?	YES__ NO__
x_po_Agi_4	Do you engage in other activities in addition to raising cattle and/or farming on the farm (aquaculture, apiculture, etc.)? YES__ NO__	
x_po_Agi_4.a	Aquaculture	
x_po_Agi_4.b	Apiculture	
x_po_Agi_4.c		
x_po_Agi_4.d		
x_po_Agi_4.e		
x_po_Agi_5.a	Out of all your economic activities, which ones earn you the most income? List from highest income (1) to lowest income (3)	
	1	
	2	
	3	

Table A-1 (cont'd)

br_1	Do you compost?	YES__ NO__
br_2	Do you have living fences on your property? (If no, go to question **br_3**☒)	YES__ NO__
br_2.a	How long have you had living fences?	
br_2.b	Do you use native species in the living fences?	YES__ NO__
br_2.b .1	How long have you been using native species for the fences?	
☒ br_3	Do you use native species for cattle shade?	Yes__ NO__
br_3a	How long have you been using native species for the shade?	
br_4	Do you have an area set aside for conservation (such as a forest, wetland or river vegetation) within your property? (*If no, go to question* ***br_5*** ☺)	YES__ NO__
br_4a	How long have you been protecting it?	
br_4b	Why do you have that area?	
☺ br_5	Do you use forest grazing practices in raising cattle?	YES__ NO__
br_5a	How long have you been using them?	
aw_1	Do you know where the water you consume in your home comes from?	YES__ NO__
aw_2	Do you know where the water your cattle consumes comes from?	YES__ NO__
aw_3	Do your cattle have direct access to water sources and do they drink from them?	YES__ NO__
aw_4	Do you dispose of any waste in water sources? (*if the answer is NO go to question aw_4c* ☺)	YES__ NO__
aw_4a	Do you know which populated area is the closest to where you dispose of your own waste water?	YES__ NO__
aw_4b	What is it?	
☺ aw_4c	How do you handle your waste? _____ _____ _____	

PES_1	Has any outside organization visited your town and invited the inhabitants of the town to participate in any conservation activity? (*If the person answers No, go to question* ***PES_3.*** ☒)	Yes	No
PES_1. a.	If yes, what is/are the name(s) of the organization(s)?		

Table A-1 (cont'd)

PES_1. b.	What conservation activities were being promoted? Please describe them.		
	Local:		
	Regional:		
	National:		
	International:		
PES_1. c.	Who can participate in these activities?		
PES_2	Do you know if anyone in the community is involved, or has been involved in the past, in these conservation activities?	Yes	No
PES_2. a.	If yes, what type of activities? Please describe them.		
☒ PES_3	Do you know if anyone in the town who has received payments for conservation activities?	Yes	No
PES_3. a.	If yes, what does that person have to do to receive the payment?		
PES_3. a.	If yes, what type of activity? Please describe.		
☒ PES_4	Have you received payments for conservation activities? (*If the person answers Yes, go to question in-kind_1.* ***Beneficiaries****) (If the person answers No, go to question* ***PES_ 5b (non-beneficiaries, control)***	Yes	No
PES_4. a.	If yes, what do you have to do to receive the payment? What type of activity? Please describe. _____ _____ _____ _____		
PES_4.b	If no, why? List all that apply:		
	a	Was not interested	
	b	Your farm did not meet the requirements	
	c	There was no room left	

Table A-1 (cont'd)

	d	Did not trust the organizations managing the programs				
	e	Did not have the information in time				
	f	Did not have time to enroll in the program				
	g	Other				
PES_5	Would you be interested in joining the program now?				Yes	No
PES_5.a	If yes, why? _____ _____ _____					
PES_5.b	If no, why? _____ _____ _____					
PES_6	Are you satisfied with the payments? (If yes, continue to **PES 7 and 8.** If no, go to **PES 9 and 10.**☺)				Yes	No
PES_7	With which aspects are you satisfied? List all that apply:					
	1	The type of benefit				
	2	The amount paid				
	3	The frequency of payment				
	4	Other _____ _ _____ _____				
PES_8	Please state why you are satisfied, indicating whether or not you agree with the following statements:					
	a. I strongly disagree	b. Disagree	c. I don't know	**d. Agree**	**e. I strongly agree**	
PES_8. a.	It is fair because everyone receives payment according to their efforts to change the land use in order to protect the biodiversity.					
PES_8. b.	It is fair because everyone receives payment according to their efforts to change the land use in order to sequester carbon.					
PES_8. c.	It is fair because each one can decide how to use the payments received.					
PES_8 d.	It is fair because past efforts are taken into account in making the payment.					

Table A-1 (cont'd)

PES_8 e.	Other _____ __				
☺ PES_9	With which aspects are you **NOT** satisfied? List all that apply:				
	1	The type of benefit			
	2	The amount paid			
	3	The frequency of payment			
	4	Other _____ _____ _____			
PES_10	If you **ARE NOT** satisfied with the payments, please state whether or not you agree with the following statements:				
	a. I strongly disagree	b. Disagree	c. I don't know	**d. Agree**	**e. I strongly agree**
PES_10. a.	It is not fair because some receive more payments than others.				
PES_10. b.	Other reason: _____ _____ _____ _____ _____ _____				
PES_ 11.	Who in the household receives the payments?				
PES_12	What is the income used for in the household?				
in-kind_1.	Do you know if anyone in the town has received in-kind benefits such as technical assistance or seeds in exchange for participating in a conservation activity or future conservation efforts? *(If the person answers No, go to question* ***in-kind_2****.)*				YES__ NO__
in-kind_1.a.	If yes, what benefits does that person receive? _____ _____ _____ _____				

Table A-1 (cont'd)

in-kind_1.	What must this person do to receive those benefits? _____ _____ _____ _____
in-kind_1.c.	What type of activity? Please describe: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____
If the person answers technical assistance:	
in-kind_1.d	Who provides the assistance? _____ _____ _____ _____ _____ _____
in-kind_1.e	What type of assistance is provided? _____ _____ _____ _____ _____ _____ _____ _____
in-kind_2.	Have you received in-kind benefits such as technical assistance or seeds in exchange for participating in a conservation activity or future conservation efforts? YES__ NO__
	(If the person answers No, go to question ***final_1 (Beneficiaries)).*** *(If the person answers No, continue with question* ***in-kind 2.c. (non-beneficiaries - control)*** ☺***)***

Table A-1 (cont'd)

in-kind_2.a.	If yes, what must you do in return for the in-kind benefits? What type of activity? Please describe: _____ _ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	
in-kind_2.b.	If yes, what in-kind benefit do you receive? **(*go to question in-kind_3)*** _____ _____ _____ _____ _____ _____ _____ _____	
in-kind_2.c. ☺	If no, why? List all that apply: **(*go to question in-kind_5*)** _____ _____ _____ _____ _____	
	a. Was not interested b. Your farm did not meet the requirements c. There was no room left d. Did not trust the organizations managing the programs	e. Did not have the information in time f. Did not have time to enroll in the program g. Other _____
in-kind_3.	Are you satisfied with your in-kind benefits? *(If no, go to question **in-kind_3**)*	YES__ NO__
in-kind_3. a.	If yes, with which aspects are you satisfied? *(Beneficiaries) go to question **in-kind_4*** ☻ _____ _____ _____ _____ _____	
	1. The types of in-kind benefits	
	2. The frequency of the in-kind benefits	
	3. Other reasons _____	

Table A-1 (cont'd)

in-kind_3. b.	If no, why aren't you satisfied? *(Beneficiaries) go to question* ***in-kind_5*** ☹_____ _____ _____ _____ _____				
	1. The types of in-kind benefits				
	2. The frequency of the in-kind benefits				
	3. Other reasons _____				
☻ in-kind_4.	Please state why you are satisfied:				
	a. I strongly disagree	b. Disagree	c. I don't know	**d. Agree**	**e. I strongly agree**
in-kind_4.a.	It is fair because everyone receives the same in-kind benefits.				
in-kind_4.b.	It is fair because we learn new things (technology, management).				
in-kind_4.c.	It is fair because we receive inputs (tools, seeds, information).				
in-kind_4.d.	It is fair because they teach us to take better care of our farm and the resources on it.				
☹ in-kind_5.	If you ARE NOT satisfied with the in-kind benefits, please state whether or not you agree with the following statements:				
	a. I strongly disagree	b. Disagree	c. I don't know	**d. Agree**	**e. I strongly agree**
in-kind_5.a.	It is not fair because some receive better in-kind benefits.				
in-kind_5.b.	It is not fair because the training is held very far away and I cannot go.				
in-kind_5.c.	It is not fair because the trainings are held during days and/or times that make it impossible for me to attend.				
final_1	Compared with other community members, how would you describe your financial situation? Would you describe yourself as (choose one):				
	Very Poor		Poor	Average	Wealthy
final_2	Year of birth				Y
final_ 3	Gender:			M	F
final_4	What was the highest grade of education you finished?				

Table A-1 (cont'd)

Hypothetical action		
h.a_1	If someone else invited 10 people from your community to plant trees in a site that everyone uses, such as, for example, a school or the xxxx, how many of those 10 people do you think would participate? _____	
h.a_2	Would you participate in this activity if you were invited to?	YES__ NO__

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