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Facultad de Ciencias Sociales y Económicas

Apartado Aéreo 25360

Calle 13 No. 100-00 Edificio D12 Oficina 2027

Ciudad Universitaria de Meléndez

Teléfonos: 3212100 ext.3163 - 331 5200

Email: cidse@correounivalle.edu.co

Cali Valle – Colombia

An experimental approach to the design of payment for ecosystem services: the role of plural motivations and values

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Stefany Maca-Millán¹, Paola Arias-Arévalo², Lina Restrepo-Plaza³

Abstract

Incentives based on extrinsic motivations such as Payments for Environmental Services (PES) could negatively affect intrinsic motivations (i.e., motivational crowding-out). This effect occurs when conservation levels after the intervention decline relative to those existing before the PES implementation. However, few experimental studies have assessed PES effects on motivations once financial incentives are missing. Moreover, experimental research still lacks insights on PES designs that may prevent motivational crowding-out. This research aims to i) provide a classification of plural motivations and values; ii) assess the motivational crowding effects associated with a PES design based merely on monetary incentives; and iii) assess the motivational crowding effect of integrating plural motivations and values in PES design via environmental awareness and social recognition. We conducted a lab-in-the-field experiment followed by a questionnaire involving 120 participants in rural Cali, Colombia. We use a difference in differences (DiD) approach to show that while PES had a crowding-out effect, integrating plural motivations and values via environmental awareness had a crowding-in effect on conservation. We also found that irrespectively of the PES treatment women were more prone to conservation. We conclude that conservation instruments such as PES could be more effective if they integrate plural motivations and values, rather than only emphasize extrinsic motivations and instrumental values.

Keywords: conservation motivations, environmental values, intrinsic values, lab-in-the-field experiment, relational values, plural values, pro-environmental behavior, public goods

JEL codes: Q57, D9; H41; C9

¹ Master's Program in Applied Economics, Department of Economics, Faculty of Social and Economic Sciences, Universidad del Valle, Colombia. E-mail: stefanym500@gmail.com

² Corresponding Author. Department of Economics, Faculty of Social and Economic Sciences, Universidad del Valle, Colombia. E-mail: : paola.arias@correounivalle.edu.co

³Department of Economics, Faculty of Social and Economic Sciences, Universidad del Valle, Colombia. E-mail: lina.restrepo@correounivalle.edu.co

1. Introduction

Payments for Environmental Services (PES) are incentive-based mechanisms aimed at promoting ecosystems conservation (Wunder, 2005; Engel et al., 2008; Muradian et al. 2010; Somerville et al., 2010). By definition, PES is grounded on extrinsic motivations (Rode et al., 2015) i.e., on the instrumental value of carrying out a particular activity (Ryan & Deci, 2000; Rode et al., 2015). However, there are multiple motivations beyond economic incentives which influence people conservation behavior, as is the case of intrinsic motivations (García-Amado et al., 2011; Fisher, 2012; Rode et al., 2015; Ruiz-Mallén et al., 2015; Kerr et al., 2017; Ezzine-de-Blas et al., 2019; Moros et al., 2019). Intrinsic motivation occurs in activities that lead to individual satisfaction because they are inherently interesting, fun, or they meet a challenge or personal conviction (Ryan & Deci, 2000).

Extrinsic motivations such as PES do not necessarily complement intrinsic motivations (Bowles, 2008). While in some cases, intrinsic motivations might get reinforced (Dedeurwaerdere et al., 2016; Alix-García et al., 2018; Andersson et al., 2018), the conservation literature has also pointed out that in some others they could get “crowded-out,” which is worrisome because of the finiteness of these incentives (Jack, 2009; Narloch et al., 2012; García-Amado et al., 2013; Muradian, 2013; Muradian et al., 2013; Rode et al., 2015; Ruiz-Mallén et al., 2015; Kerr et al., 2017; Ezzine-de-Blas et al., 2019; Kaczan et al., 2019).

Intrinsic and extrinsic motivations may coexist during the implementation of a PES. Thus, to better assess the effect of the intervention on motivations, we shall evaluate the motivational levels when the PES ceases (Chervier et al., 2019; Ezzine-de-Blas et al., 2019). If the PES crowded-out intrinsic motivations, withdrawing the incentive leads to conservation levels reduction. Such effect occurs, for example, when payments change people's conservation logic, based on moral norms or obligations (Bowles, 2008; Kerr et al., 2017), towards a purely instrumental one (Vatn, 2010). Conversely, if the PES had a positive impact on intrinsic motivations, i.e., a crowding-in effect, conservation levels at the post-intervention period would be higher than they were before the payment. Crowding-in outcomes occur when the economic incentive reinforces positive attitudes towards conservation (Somerville et al., 2010). It is important to recall that motivations will not only be influenced by the PES and its design but by other factors related to personal (e.g., gender, age, education, culture) and interpersonal contexts. (e.g., institutions such as social norms and markets) (Ezzine-de-Blas et al., 2019).

The best approach to empirically assess PES' effects on motivations would ideally require carefully controlled longitudinal research aimed at determining the causality between the incentive implementation and motivation crowding in/out. (Fisher, 2012; Ezzine-de-Blas et al., 2019).

However, there is also a growing literature applying lab-in-the-field experiments (Jack et al. 2009; Narloch et al., 2012; Midler et al., 2015; Kaczan et al., 2019; Moros et al., 2019) in which different PES designs and their effects on motivations are tested using behavioral methods. Nonetheless, and despite the relevance of analyzing what happens when a PES ends (Chen et al., 2009; Kerr et al., 2017; Ezzine-de-Blas et al., 2019; Kaczan et al., 2019), very few experimental studies (c.f. Salk et al., 2017; Andersson, et al., 2018, Kaczan et al., 2019) have assessed its effects on motivations once the financial incentive is missing.

Moreover, experimental research still lacks insights on PES designs that may aid in avoiding motivational crowding-out (Kerr et al., 2017). For example, environmental education has been already integrated into PES designs (Wendland et al., 2010; García-Amado et al., 2011; Mutoko et al., 2015; Jespersen & Gallemore, 2018). While researchers have also stressed the role of social norms (i.e. norms regarding how a community/person should behave), in PES effectiveness (Jones et al., 2008; Chen et al., 2009; Grillos et al., 2017; Janssen, 2017; Kerr et al., 2017). Some PES have been aligned with social norms such as being recognized by peers as a pro-conservation person (or community) (García-Amado et al., 2011; Kaczan et al., 2013). Such approaches imply recognizing that beyond economic incentives, the integration of plural values and motivations in environmental policies such as PES could also foster pro-environmental behavior (Pascual et al. 2017).

The objectives of this paper are three-fold. Firstly, we provide a classification of motivations and values, that considers social psychology approach on motivations (Ryan & Deci, 2000) but also recent discussions on plural values from the sustainability field (Pascual et al., 2017; Arias-Arévalo et al., 2018, Himes & Muraca, 2018). Secondly, we assess the motivational crowding effects associated with a PES design based merely on monetary incentives, by implementing a behavioral game (i.e. a threshold public good game) with a within-subjects' paradigm. Thirdly we assess the motivational crowding effect of integrating plural motivations and values in PES design via environmental awareness and social recognition.

2. Classifying motivations in PES contexts: integrating motivations and values

In the PES field, motivations have been broadly classified into intrinsic and extrinsic motivations while some subcategories have also been recognized (e.g., García-Amado et al., 2013; Rode et al., 2015; Moros et al., 2019). One aspect that stands out in these classifications is that there is not a standard agreement on how these motivations relate to ethical issues of human-nature relationships. For example, Rode et al., (2015) and García-Amado et al., (2013), classified as intrinsic motivations non-anthropocentric values such as moral duty and respect for nature. Yet, Moros et al. (2019) rank the pleasure or enjoyment of protecting forests, which is an

anthropocentric value, as intrinsic motivation. We propose a classification framework that integrates the intrinsic/extrinsic motives from social psychology with recent classifications of environmental values.

We define environmental values as reasons of importance that people attribute to nature (Gómez-Baggethun & Martín-López, 2015; Arias-Arévalo et al., 2018). Recently, sustainability scholars have endorsed the view that Nature matters in multiple ways (i.e. value pluralism), which are all relevant for sustainability transitions (Zafra-Calvo et al. 2020). These scholars have stressed the classification of environmental values as intrinsic, relational and instrumental (Jax et al., 2013; Pascual et al., 2017; Arias-Arévalo et al., 2018; Himes & Muraca, 2018). This classification is policy-relevant as it was also adopted by the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) (Pascual et al., 2017).

Intrinsic values are associated with a system of non-anthropocentric values, and encompass the recognition that non-human entities are valuable in themselves and are subject to moral consideration, regardless of human needs, preferences, or interests (Batavia & Nelson, 2017; Himes & Muraca, 2018). In a non-anthropocentric value system, humans are members of the biosphere community and they are not considered a superior species (Marcos, 1999; Gudynas, 2010).

Instrumental values only recognize the importance of entities as a means to ends; which conceptually implies the idea that such entities could be replaced or compensated by others that fulfill the same purposes (Muraca, 2011; Himes & Muraca, 2018). This approach relies on a strong anthropocentric value system where humans receive a special place in nature and are considered more valuable than other species (Marcos, 1999). Moreover, under this vision, Nature is only valuable as long as it meets human needs and preferences (Marcos, 1999).

Relational values refer to values attributed to human-nature relationships that are a fundamental component for the good life (eudemonia) or as the basis for explaining our existence and that of other beings (e.g., symbolic, aesthetic, spiritual or psychological values) (Muraca, 2011; Chan et al., 2016; Arias-Arévalo et al., 2017; 2018). These relationships are more complex and more profound than those framed by instrumental values, as they are not considered simply as a means for personal purposes, but rather constitute *what we are* (Himes & Muraca, 2018). Relational values are, therefore, compatible with a moderate anthropocentrism (Marcos, 1999) approach that recognizes human needs and interests beyond their purely economic or instrumental benefits.

Table 1. presents a classification of motivations for PES that integrates motivations and plural values. In social psychology, motivations are understood as what moves us to do something (why

do we do something?) (Ryan & Deci, 2000). Here we link environmental values to motivations, as the former explain specifically why it is important (valuable) to do something that seems inherently interesting to us (intrinsic motivations) or why it is important to do something that leads to a separable outcome (extrinsic motivations).

Table 1. Classification of environmental motivations and values for PES and other conservation contexts

Motivation	Value system	Values	Value expression	Description	Example statements
Intrinsic	Non-anthropocentric	Intrinsic	Preservation of Life on Earth	Concern for biodiversity, ecosystems or ecosystem services in favor of protecting the lives of human and non-human beings.	I conserve the forest to protect the water which is fundamental for preserving human and non-human life
			Nature's rights	Considerations of rights attributed to nature, ecosystems or species, since they are considered ends in themselves.	I conserve the forest because animals and plants have the right to live
			Moral obligation	Consideration of moral duties or obligations towards biodiversity and ecosystems.	I believe that nature deserves respect and we are obliged to protect it
	Moderate anthropocentric	Relational	Enjoyment	Appreciation of positive effects associated with nature conservation such as pleasure, joy, satisfaction.	I enjoy and feel happy when I do conservation activities (for example tree planting, bordering of riversides, protection of river sources)
			Aesthetic	Appreciation of the beauty of nature, based on sensations and emotions it inspires.	I conserve the forest because I like to enjoy the landscape, its colors, smells, shapes, and textures
			Identity	Biodiversity and ecosystems are considered references to determine the sense of personal and social identity of people.	I conserve the forest because I define myself as an environmentalist
			Sense of place	Emotional attachment to a place (feelings of belonging, commitment, identity or community).	I conserve the forest because I feel connected to this territory
			Altruism towards community members	Concern for biodiversity, ecosystems or ecosystem services in favor of the community.	I conserve the forest because my neighbors and the urban people benefit from the ecosystem services generated by this action
			Altruism towards family members	Concern for biodiversity, ecosystems or ecosystem services in favor of family members.	I conserve the forest because my family benefits from the environmental services generated by this action
			Bequest	Concern for biodiversity, ecosystems or ecosystem services in favor of future generations.	I conserve the forest because I want future generations to enjoy it
Recreation/ Leisure	Appreciation of tourism, recreation and leisure activities in natural areas.	I conserve the forest because it is a special space where I can recreate and spend my free time			

Motivation	Value system	Values	Value expression	Description	Example statements
			Social Cohesion	Appreciate nature, biodiversity or ecosystems as a context for the improvement of social cohesion.	I conserve the forest because it is a space where I can share with my neighbors or other people
			Gratitude	Appreciate nature, biodiversity or ecosystems in terms of a feeling of gratitude for being the giver of life, for the ecosystem services it offers or the relationships that are woven through it.	I conserve the forest because I want to give back somehow what nature gives me
			Sacredness/religious/spiritual	Sacred, religious or spiritual attachment to biodiversity and ecosystems.	I conserve the forest because I consider that nature is sacred or has an important spiritual value
			Personal growth	Appreciation of nature, biodiversity or ecosystems for allowing us to learn from ourselves, adopt new ideas or ways of thinking that improve the quality of life through contact with nature.	I conserve the forest because it allows me to reflect and grow as a person
			Living a Good Life- <i>Buen Vivir</i>	Consideration of nature, biodiversity, and ecosystems as a central axis of people to live a "good life.	For me, a good life implies being in harmony with nature
			Reputation-social recognition	Appreciation of nature, ecosystems or biodiversity in virtue of the opinions or positive ideas that people have about a person's pro-environmental behavior.	I conserve the forest because I like to be positively recognized by those around me and that makes me feel good
			Compliance with social norms	Carrying out conservation actions for the appreciation of complying with shared understandings of how a community should behave towards nature.	I conserve the forest because people close to me do it and they expect me to do it too, and doing so makes me feel good
			Knowledge	Appreciation of the characteristics of ecosystems with a special educational and scientific interest.	I conserve the forest because nature is a space that allows me to learn through direct and practical experience
			Livelihoods	Appreciation of nature, ecosystems, and biodiversity as a provider of subsistence materials.	I conserve the forest because it ensures me and my family the provision of water, food, and materials that are vital for our subsistence

Motivation	Value system	Values	Value expression	Description	Example statements
			Physical health	Appreciation of nature, ecosystems, and biodiversity for the physical benefits perceived by the regulation of water, air, and diseases.	I conserve the forest because it regulates the weather, the air, the temperature, contributing positively to my health
			Mental and emotional health	Appreciation of nature, ecosystems, and biodiversity for the mental benefits associated with exposure and contact with nature.	I conserve the forest because being in nature generates peace and tranquility
Extrinsic	Strong Anthropocentric	Instrumental	Obtain a monetary or in-kind compensation	Carry out conservation actions for the payments that a person will receive in return.	I conserve the forest because I will be paid monetary compensation or I hope to receive it
			Income generation from Forest Products	Perform conservation actions as an income source derived from the associated products and services.	I conserve the forest because it generates natural resources that I can sell or exchange (e.g. food, wood)
			Social pressure	Perform conservation actions due to the influence of a group of people, generating feelings of rejection or discomfort.	I conserve the forest because I feel pressured by my neighbors and acquaintances to do it, and that bothers me
			Fines	Carry out conservation actions due to the fines a person would entail if not acting accordingly, generating feelings of rejection or discomfort.	I will not cut down the forest because I am distressed that I will be fined by the environmental authorities
			Obligation to comply with other authority regulations	Perform conservation actions for the obligation to comply with authorities' norms, generating feelings of rejection or discomfort.	I conserve the forest because I am obliged to comply with the regulations of the environmental authorities and that bothers me

Source: Adapted from Arias-Arévalo et al., (2017, 2018) and with insights from Marcos, (1999); Caissie & Halpenny, (2003); Ruiz-Mallén et al., (2015); Admiraal et al., (2017).

We have classified intrinsic and relational values as intrinsic motivations because the valued entities are not entirely separable from its value, as is the case with instrumental values (Arias Arévalo et al. 2018; Himes & Muraca, 2018). In the domain of intrinsic values, for instance, a person may consider inherently interesting to reforest to protect the rights of nature or to fulfill their moral principles. In turn, relational values such as identity, social cohesion, aesthetic value, social recognition, or sacred values are classified as intrinsic motivations because they rely on the non-substitutable benefits that one fulfills in the interaction with nature.

Instrumental values are classified as extrinsic motivations because when an entity is valued in such terms, it is only a means to an end. If a landowner conserves the forest only because she would receive a monetary compensation, she could replace this action with another that generates the same benefit (e.g., crops). Instrumental values also include, for example, conserving a forest due to the pressure of the social group or to avoid a legal fine. In these examples, people act controlled by an outsider, and this generates feelings of resistance, resentment, and disinterest (Ryan & Deci, 2000). Finally, we recall that these motivations and values are not mutually exclusive: a person may express multiple kinds of them when arguing about their pro-environmental behavior.

3. Methodology

3.1. Study Area

We conducted the fieldwork in the *corregimiento*⁴ Los Andes and Pichindé, located in Cali rural area, department of Valle del Cauca in southwest Colombia. One hundred ten (110) people of Los Andes participated, while 10 were from the adjacent *corregimiento* of Pichindé. These two *corregimientos* belong to the upper-middle basin of the Cali River, together occupying a total area of 8.106,2 ha. (6.610,5 ha. of Los Andes and 1.495,7 ha. of Pichindé). In 2016, these two *corregimientos* had a population of 5.279 inhabitants (Alcaldía de Santiago de Cali, 2017). The area encompassed by these two *corregimientos* is of ecological importance since part of their territory belongs to a forest reserve and also to the Farallones National Natural Park. These protected areas have sub-Andean forest ecosystem which is rich in bird endemism and a variety of amphibians, reptiles, and mammals (PNNC, 2019). Also, the Cali River is one of the sources of freshwater for the rural and urban inhabitants of the municipality of Santiago de Cali. However, this area has been affected by fires, erosive processes, agrochemicals pollution, forest fragmentation and biodiversity loss (Alcaldía de Santiago de Cali, 2017). Mining activities have been also affecting biodiversity and the water quality of the Cali River (CGST, 2013).

⁴ Refers to the smallest administrative unit in Colombia.

Inhabitants of this area state that the ecological prioritization of this area has become an obstacle for their livelihoods because they face too many restrictions for the execution of agricultural and rural tourism projects. In response, some of the inhabitants have been carrying out illegal actions in the area such as mining and logging while others have migrated (Secretaría de Desarrollo Económico, 2018). Local people also manifest problems associated with ecotourism impacts, and the lack of participation and inclusion in ecotourism revenues (Alcaldía de Santiago de Cali, 2017). The expansion of the agricultural frontier by residents, which seek to obtain income through forest exploitation, generates deforestation risks. Therefore, this area has been prioritized by different local and national organizations for the implementation of PES projects (e.g., Patrimonio Natural, 2015; DAGMA, 2018). During 2013-2015, a PES program was carried out, which linked the environmental authorities and organizations, the municipality and the public services company of Cali (Empresas Municipales de Cali-EMCALI) (Patrimonio Natural, 2015). In 2017, a new PES scheme was designed and began to be implemented in 2018 by the urban environmental authority (Departamento Administrativo de Gestión Ambiental- DAGMA). Under this PES scheme, in 2018, 11 agreements were signed with community organizations for an amount close to US \$ 202,947, benefiting 145 families. This PES agreement guaranteed the conservation of 37.6 hectares of forest in the year 2018 (DAGMA, 2018).

3.2. The experimental game

We implemented a lab-in-the-field experiment where community members were invited to play a 15-rounds threshold public goods game (PGG). The traditional PGG has been widely used to study cooperation in the presence of egoistic incentives to free-ride. However, we wanted our game to elicit the need for some coordination to diminish subjects' incentives to take advantage of the others' efforts. Thus, by introducing the threshold, we ensured that PG is only provided when the group has reached the minimum conditions for it to happen. This attribute in the design mimics real-life situations in which environmental service provision is conditioned on collective performance (Moros et al., 2017).

We adapted the game proposed by Midler et al., (2015) and Moros et al., (2019), which was played in fixed groups of four participants. Each participant received an individual endowment, framed as four hectares (ha.) of land, to distribute between a public project, x_B , (forest conservation) and a private-productive activity, x_C , (cultivating a crop). The threshold represents the minimum conservation effort for the group to receive the public-good benefit (e.g., freshwater provision). The dilemma arises from the temptation of benefiting from the public project, even without making any contribution to it.

Participants faced the 15 rounds (t) of the game, divided into three stages of five rounds each. In the pre-intervention stage, rounds 1-5, we emulated a scenario where participants make conservation/production decisions that do not only affect theirs but also their community. Equation 1 describes the individual (i) payoff function per round, π_{it} : each hectare allocated to crops yielded US\$1,9, and each hectare assigned to forest conservation paid US\$0,3⁵. If the group reached a 7 ha., the threshold for forest conservation, each group member received US\$0,6 for each hectare that was destined for the public project⁶. Equation 1 represents the basic game.

$$\pi_{it} = \begin{cases} \$1,9x_{Cit} + \$0,3x_{Bit} + \$0,6(\sum_{i=1}^4 x_{Bit}) & \text{if } \sum_{i=1}^4 x_{Bit} \geq 7 \\ \$1,9x_{Cit} + \$0,3x_{Bit} & \text{if } \sum_{i=1}^4 x_{Bit} < 7 \end{cases} \quad (1)$$

Equation 2 details the payoff function in rounds 6-10. It represents the PES intervention stage when we incentivize participants' contribution to the public conservation project by increasing in US\$0,6 the individual's conservation returns.

$$\pi_{it} = \begin{cases} \$1,9x_{Cit} + \$0,3x_{Bit} + \$0,6(\sum_{i=1}^4 x_{Bit}) + \$0,6x_{Bit} & \text{if } \sum_{i=1}^4 x_{Bit} \geq 7 \\ \$1,9x_{Cit} + \$0,3x_{Bit} & \text{if } x_{B \sum_{i=1}^4 x_{Bit}} < 7 \end{cases} \quad (2)$$

Finally, in the post-intervention stage, rounds 11-15, subjects went back to conditions of the first stage or the basic game (Equation 1). We withdraw the PES to represent the finite-kind of these types of interventions (Kerr et al., 2017; Kaczan et. al., 2019). By comparing the pre-and-post-intervention stages, we can measure, within-subjects, motivational crowding-in or crowding-out (Ezzine-de-Blas et. al., 2019).

3.3. The experimental design

As illustrated in Figure 1, we conducted four treatments following a between-subjects protocol. In the control treatment, the baseline threshold public good game takes place all rounds with no change in the incentives; meaning that we did not implement a PES intervention stage (i.e., in all the 15 rounds the participant faces the basic game or the payoff function described in Equation 1). The rationale for this treatment is to be able to compare participants' contributions over time by carefully controlling for the behavioral trend. The PES treatment (or traditional PES treatment) resembles the experimental game as described in the previous subsection, i.e., it contains a pre-intervention stage, a PES-intervention stage, and a post-intervention stage.

⁵ The average exchange rate in November 2018 was COP \$3.212,48 per dollar.

⁶ Even when participants received feedback after each round, we follow a strict protocol of anonymity to maintain incentive-compatibility.

Figure 1. The experimental design

		within-subjects approach																		
		1. Pre-intervention (baseline)					2. Intervention					3. Post-intervention								
		Stage		Round		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
between-subjects approach	Control	Basic game (Eq. 1)					Basic game (Eq. 1)					Basic game (Eq. 1)								
	PES Treatment	Basic game (Eq. 1)					PES (Eq. 2)					Basic game (Eq. 1)								
	PES + EA Treatment	Basic game (Eq. 1)					PES (Eq. 2) + EA					Basic game (Eq. 1)								
	PES + R Treatment	Basic game (Eq. 1)					PES (Eq. 2) + R					Basic game (Eq. 1)								

PES: Payment for Environmental Services, PES+EA: PES + environmental awareness; PES+R: PES+ Recognition
Eq: Equation

The Environmental Awareness PES treatment (PES+EA) follows exactly the decision process and payoffs of the PES treatment except that we introduce a mood induction activity at the beginning and the end of the intervention stage (Kucera & Haviger, 2012). At the beginning of round 6, an environmental psychologist carried out a guided reflection through which we primed participants to reconnect with nature by eliciting positive feelings and recalling pleasant memories surrounded forests and rivers. At the end of round 10, right after we announce the PES withdrawal, the psychologist also reflected upon the potential effects of Nature deterioration⁷. In both reflections, an emphasis was made on the relational and intrinsic values of Nature (Appendix B).

Finally, in the Recognition-PES (PES+R) treatment, we implemented a status-based-non-monetary reward based on the idea that an individual's pro-environmental behavior could be influenced by the positive opinions or ideas that other people have about such behavior (i.e. relational value of social recognition). At the beginning of round 6, we announced that those individuals who allocated a more significant proportion of their lands to conservation were going to be publicly acknowledged. By not mentioning when or how the recognition was going to take place, we expected the non-monetary reward to be equally effective across the 5-intervention rounds. At the end of round 10, and once we withdrew the PES, we called the top 10 conservation-contributors upfront and we handed a small trophy to each of them. They were also encouraged to let the session participants know their contribution reasons. Through the prize and the mentoring, we wanted to stimulate the contributions of the rewarded via incentives, and the conservation of the others, via reciprocity.

3.4. Procedures

We conducted two sessions per treatment between November and December 2018 (Table 2). Leaders of the rural area carried out participants' recruitment. They distributed an informative note

⁷ Since we are only interested in the impact of environmental awareness on individuals' behaviour as a whole, we do not disentangle the effect of the reflection in round 6 and round 10.

inviting the community members to participate in a university’s activity to understand how people in the rural area made decisions. They were also informed that they could earn at least US \$ 6.23 for their participation. Each session lasted, on average, 3.5 hours and was implemented following a paper and pencil protocol. We had between 12 and 20 participants per session⁸.

Table 2. Number of independent observations and participants per treatment

	Control	PES	PES+EA	PES+R	Total
Group size	4	4	4	4	-
Independent observations	7	8	8	7	30
Total of participants	28	32	32	28	120

PES: Payment for Environmental Services Treatment, PES+EA: PES + environmental awareness treatment; PES+R: PES+ Recognition treatment

We randomly assigned individuals to anonymous groups upon arrival and handed over the experiment instructions and informed consents. At the beginning of each stage, the experimentalist read out loud the new instructions and explained the payoff functions. We also handed participants with cards that provided visual help to make their conservation decisions. We gave feedback after each round for participants to update their choices according to what the other group members did⁹.

We wanted our participants to take the decision at each round as it was definitive and keep the opportunity cost constant during the session; that is why we publicly announced that one random round was going to be selected to account for the participants’ payments¹⁰. Payoffs were on average US\$9,94 which was 1.2 times the minimum wage per day in 2018. Each person received their payment individually and confidentially.

3.5. Post-experimental questionnaire

We also implemented a two-part questionnaire. In the first part, we asked participants to assess the role of the 27 motivations presented in Table 1 in their conservation decisions. Participants used a 4-items scale that started from ‘non-important’ to went up to ‘very important’. To make sure they put some effort into the assessment, we asked them to assign the “very important” category up to

⁸ We ran two pilot sessions with 16 college students of the Social and Economics Sciences Faculty at Universidad del Valle.

⁹ For calculating individual and group outcomes and avoiding boredom, we individually distributed Tan-gram puzzles in between rounds for them to make while waiting for the next round.

¹⁰ We could have paid each round separately, but that would have reduced each round payment to negligible amounts, which might undermine subjects’ ability to dimension the consequences of their decision-making. We randomly selected one round to be relevant for payments.

five of the 27 motives (Appendix A). In the second part, we collected socio-demographic data (Appendix B), including their current or previous participation in PES programs.

3.6. Data Analysis

Following Kaczan, et al., (2019) and Moros et al., (2019), we computed the treatment effects and the PES crowding-in/crowding-out by following a differences-in-differences approach (DiD) on the number of hectares intended for conservation. We estimated a random-effects-ordered logit, clustered at a group level to account for the in-group heterogeneity. Equation 4 displays the model specification.

$$\Pr(x_{Bit}^j = 0; 1; 2; 3; 4) = \beta_1 E_2 + \beta_2 E_3 + \beta_3 T_j + \alpha_1 E_2 T_j + \alpha_2 E_3 T_j + \sum_{k=1}^K \gamma_k Z_k + v_i + e_{it} \quad (4)$$

Being $x_{Bit} \in \{1,2,3,4\}$, the hectares intended to forest conservation of subject i in round t . E_2 and E_3 are dummy variables representing the intervention (PES) and post-intervention stages, respectively. T_j is the behavioral treatment variable (i.e., environmental awareness or recognition) which takes the value one if the subject faced treatment j , and zero otherwise. $\alpha_1(\alpha_2)$ accounts for differences in conservation due to the interaction of the intervention (post-intervention). The Z -vector comprises k control variables that may explain the variance of the dependent variable. Because of the nature of the dataset, we employed random effects at the individual level $v_i \sim N(0, \sigma_v^2)$ in our estimation.

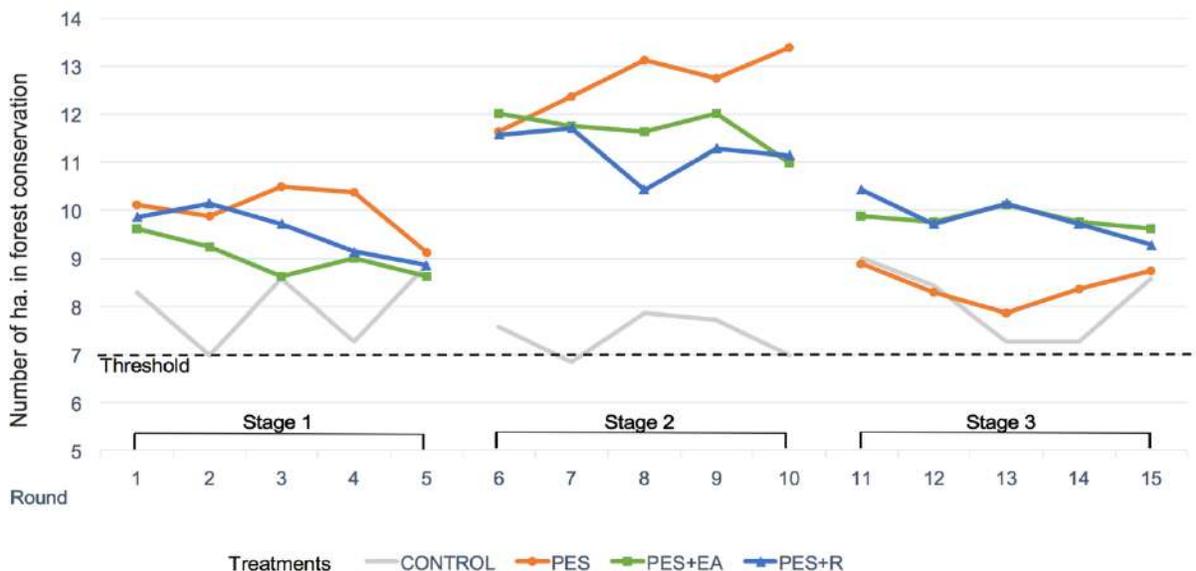
The model in Table 5 incorporates all observations and the treatment and stage interactions to measure the impact of PES when environmental awareness and recognition are accounted for, relative to the control treatment. We included ‘age’ in years (Mean= 38,4; standard deviation: 16,1) and ‘gender’ (1: female 61%; 0: men 39%) as sociodemographic controls. Moreover, we incorporated in the regression the round variable (*round*) to identify and isolate a possible trend effect. The selected model outperformed others in terms of the log-verisimilitude, Akaike and Bayesian criteria (Appendix D).

4. Results

4.1. Descriptive statistics

Figure 2 displays the average conservation levels (forest ha.) across all groups, per round and treatment. We find high levels of cooperation for which the majority of groups systematically met the threshold.

Figure 2. Average conservation levels across all groups, per round and treatment



During rounds 6 to 10, in the control treatment, we find that the average number of hectares intended for conservation is 7,4 ha. This value increased to 12,7 ha. in the PES treatment, 11,7 ha, in the PES+EA, and 11,2 ha. in the PES+R (Figure 3). In the post-intervention stage, rounds 11-15, the average level of conservation is 8,11 ha. in the control treatment, and 8,6, 9,8, and 9,9 ha. in the PES, PES+EA, and PES+R conditions, respectively. As a result, there is a 1,5 ha loss in conservation after the intervention in the PES treatment relative to control treatment (0,1 ha.) (Table 4). According to the Wilcoxon-Mann-Whitney test, such change was not significant. We attribute these results to the sample characteristics. Since our sample is small and not entirely randomized, we required an econometric analysis to account for the individuals' characteristics and disentangle the extent of the effect of PES, PES+EA and PES+R on motivational crowding (Section 4.2).

In the case of the PES+EA (p-value=0,008) and PES+R (p-value=0,0553) treatments, the conservation level differences after and before de intervention are positive and significantly higher than the one presented in the PES treatment. The performance change of these two last treatments was not statistically different from the control condition (Table 4).

Figure 3. Average conservation levels across all groups, per stage and treatment

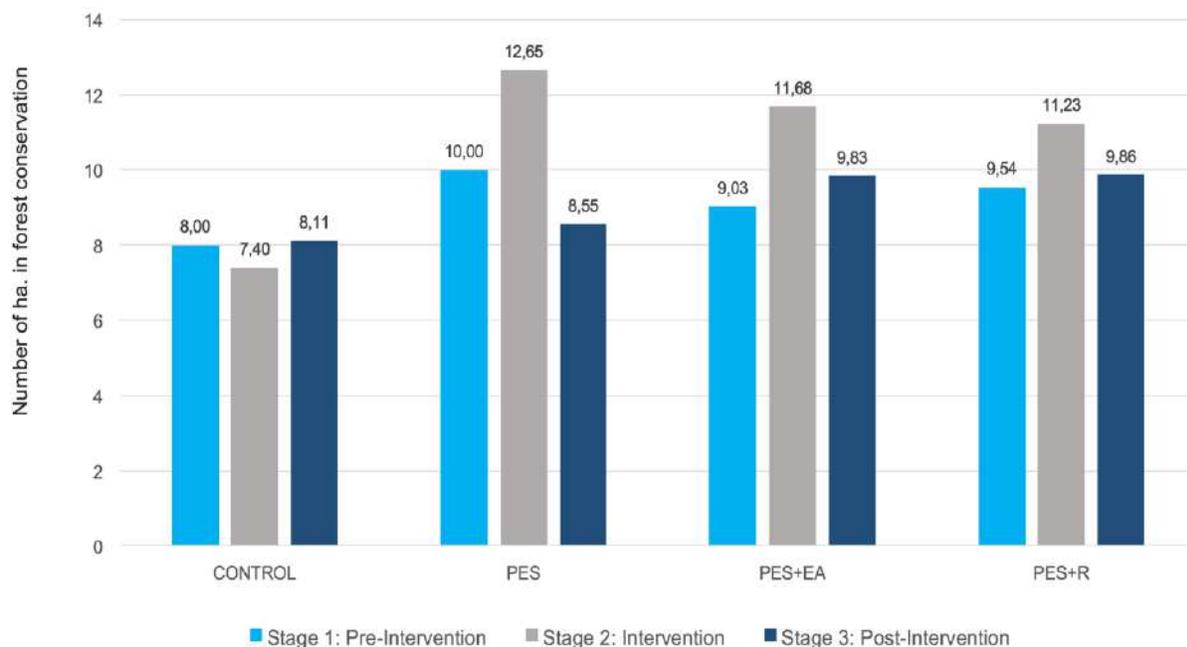


Table 4. Conservation level differences after and before intervention: mean and Wilcoxon-Mann-Whitney test results comparisons

	Control	PES	PES+EA	PES+R
Mean	0,1 Ha	-1,5 Ha	0,8 Ha	0,3 Ha
Control		z=1.565 p-value=0.1176 (-)	z=-1.042 p-value=0.2976 (+)	z=-0.256 p-value=0.7981 (+)
PES			z=-2.627 p-value=0.0086 (+) ***	z=-1.916 p-value=0.0553 (+) *

4.2. Econometric Analysis

In Table 5, we make inferences about the treatment effects relative to the control condition. We find that a traditional PES has a significant crowding-out of forest conservation in the post-intervention stage (Coef. Treatment_PES*stage3: -0,710; p-value <0,10). On the contrary, the conservation levels in the environmental awareness treatment were higher in the post-intervention stage, relative to the pre-intervention (Coef. Treatment_PES+EA*stage3: 0,516; p-value <0,10), showing a crowding-in effect relative to the control condition. While the the PES+ R treatment generated in the post-intervention stage a positive but not significant effect in conservation levels (Coef. Treatment_PES+R*stage3: 0,254; p-value >0,10).

Table 5. Ordered Logit Regressions across all treatments

Dep. var = Ha forest		
Variables	Coef.	Std. Error
period 2 (with PES)	-0,121	0,185
period 3 (post PES)	0,485	0,352
treatment_PES	0,950 **	0,386
treatment_PES+EA	0,550	0,460
treatment_PES+R	1,060 **	0,476
treatment_PES*Stage 2	2,210 ***	0,252
treatment_PES+EA*Stage 2	2,002 ***	0,246
treatment_PES+R*Stage 2	1,477 ***	0,249
treatment_PES*Stage 3	-0,710 *	0,420
treatment_PES+EA*Stage 3	0,516 *	0,295
treatment_PES+R*Stage 3	0,254	0,335
round	-0,052 *	0,030
Age	1,212 ***	0,374
gender (female=1)	0,642 *	0,327
No. obs	1755	
No. Clusters	30	
No. Participants	117	
Log-Likelihood function	-2116,1	
AIC	4270,13	
BIC	4374,06	

***P-value <0,01; ** P-value <0,05; *P-value <0,10

Estimates correspond to a random-effects-ordered-logit regression, with standard errors cluster at group level. The dependent variable (Dep. Var.) is the number of hectares committed to forest i.e., to conservation.

Ha.: hectares; Coef: Coefficient; PES: Payment for Ecosystem Treatment, PES+EA: Payment for Ecosystem with an environmental awareness treatment; PES+R: Payment for Ecosystem with a recognition treatment; Std. Error: Standard errors.

In Table 5 we also find being a female participant and age both increase the likelihood to exhibit higher levels of conservation (Coef. *gender*: 0,64; (p-value <0,10); Coef. *age*: 1,212; p-value <0,01). Consistent with the public games literature, conservation levels decreased as the rounds progress, (Coef. *round*: -0,052; p-value <0,10).

5. Discussion

PES have been proposed as a more efficient strategy to achieve conservation objectives than other indirect strategies (García-Amado et al., 2011; Dedeurwaerdere et al., 2016). In line with other

experimental studies (Midler et al., 2015; Kaczan et al., 2019; Moros et al., 2019), this research showed that PES implementation generated an increase in conservation levels (Table 4). However, PES's effectiveness may be limited to the time scale at which incentives are implemented. Several authors have discussed the negative impact of PES on environmental behavior once payments are withdrawn (Muradian, 2013; Muradian et al., 2013; Rode et al., 2015; Kerr et al., 2017; Ezzine-de-Blas et al., 2019). We found experimental evidence that payments withdrawing generate a crowding-out effect on the motivations. This is reflected in the lower conservation levels in the post-intervention stage compared with the pre-intervention one showed by the PES treatment (Table 5). Our research contributes to the field of PES motivational crowding, by including in the experimental design a third stage where incentives are withdrawn (Kaczan et al., 2019; Ezzine-de-Blas et al., 2019). However, longitudinal studies with real PES projects are still needed to evaluate the impact of these incentives on behavior and motivations.

Beyond analyzing PES crowding effects on motivations, this research also assessed how complementary strategies based on a plurality of values and motivations can be used to mitigate this effect. We found that PES designs that are complemented with environmental education (e.g. environmental awareness) or that emphasizes social norms and relational values such as social recognition, can mitigate possible crowding-out effects of a traditional PES (Table 4). Further, the emphasis on intrinsic and instrumental values by the environmental awareness PES treatment resulted in a crowding-in effect relative to the control group. (Table 5). Our design does not attempt to point to the exact effect of PES interventions on individuals' behavior, and we cannot claim that all communities will behave the same. Nonetheless, we propose that some PES designs may crowd-out people's motivations for conservation, while more plural PES designs can mitigate such effect. Further research on plural PES designs is required so the external validity of these findings can be contrasted.

Although policies based on extrinsic motivations could have a faster impact, while those based on intrinsic motivations may involve more time and risk, the latter can have positive long-term effects on environmental awareness (Dedeurwaerdere et al., 2016). In fact, in this research we found that incentives based on extrinsic motivations - such as PES – might generate a 'crowding out' effect that can be compensated by implementing PES designs that emphasize plural motivations and values such as the PES + EA. This result converges with research that alerts on the risk of policies that merely stress extrinsic motivations, since they may undermine intrinsic motivations in the long term (e.g. García-Amado et al., 2013).

We proposed plural PES designs that integrate complementary conservation strategies (i.e. environmental education and social norms) aimed at embracing multiple environmental values and

motivations (Table 1). Recently, it has been argued that articulating a plural perspective on values can contribute towards achieving the required transformations towards sustainability (Gómez-Baggethun & Martín-López, 2015; Jacobs et al., 2016; Pascual et al., 2017; Arias-Arévalo et al., 2017; 2018; Rincón-Ruiz et al., 2019; Zafra-Calvo et al. 2020). Integrating plural perspectives in environmental management implies not only recognizing instrumental and monetary values but also intrinsic (Batavia & Nelson, 2017; Piccolo, 2017) and relational ones (Chan et al., 2016; 2017; Bremer et al., 2018; Himes & Muraca, 2018). This research provides experimental evidence that policies instruments that integrate multiple motivations and values could be more effective than policies that refer only to extrinsic motivations and instrumental values (Table 4).

Environmental education has been highlighted as a relevant tool for fostering pro-environmental behavior (Mutoko et al., 2015; Caballero-Serrano et al., 2017). Our environmental awareness strategy was designed by taking into account the socio-ecological context and people's relations with their territory (Cetas & Yasué, 2016), including ecosystems' intrinsic and relational values. On the other hand, social recognition has been identified as a key social norm towards improving conservation results (García-Amado et al., 2011; Kerr et al., 2017). A person's desire for social approval or peer pressure may have a positive effect on her participation in collective actions (Gächter & Fehr, 1999), such as conservation. In a PES context, the emphasis on social norms can increase participation (Chen et al., 2009; Lapeyre et al., 2015; Bottazzi et al., 2018) and may have crowding-in effects (Kerr et al., 2017). Our results confirm that both environmental awareness and social recognition had a crowding-in effect relative to a traditional PES, once the payments were withdrawn (Table 4).

The impact of PES programs will depend on the social, economic and ecological context, (Kosoy et al., 2007; Jack et al., 2008; Muradian, 2013; Cetas & Yasué, 2016; Kerr et al., 2017; Akers & Yasué, 2019; Moros et al., 2019), including the institutional and interpersonal one (Ezzine-de-Blas et al., 2019). In this research, we analyzed some socio-economic factors that may influence the effectiveness of conservation programs such as PES (Table 4). Particularly, we found that women were more likely to conserve than men (Table 5). In a PES in Costa Rica, it was found that women relied more on intrinsic motivations (i.e. help the environment and animals), while men relied more on extrinsic ones (i.e. monetary compensation) (Schwartz, 2017). Although some PES programs have excluded women's participation (Bee, 2017; Corbera et al., 2007), it has been shown that their inclusion can facilitate PES implementation (Adhikari & Agrawal, 2013) and can also promote women's economic empowerment (Benjamin et al., 2018). Therefore, ensuring women's participation in PES programs could not only contribute to gender equity but also improve PES effectiveness and cushioning possible crowding-out effects.

Finally, we want to recall two main limitations of this research. The first one is our inability to randomize subjects' participation in our sessions. We relied on community leaders to make the recruitment for the investigation. Rural area inhabitants in the area tend to be reluctant to participate in these kinds of studies because they lack land tenure and fear the collected information will be used to evict them from their land. Others are not able to bear the opportunity cost that a half working day entails. Therefore, we did not have a large sample to choose from. Our second limitation is the lack of replication. Due to our lack of resources, we could not replicate the same study in other rural areas.

6. Conclusions

This research found experimental evidence that PES result in motivational crowding-out once the payments are withdrawn. Further, this research found that PES designs that integrate plural motivations and values- via environmental education may generate a crowding-in effect. We contribute to the field of PES and motivations in several aspects. Firstly, we assessed motivational crowding effects once payments (or the extrinsic motivation) are withdrawn, an approach that has been scarcely addressed in previous experimental studies. Secondly, we shed light on the role of integrating plural values and motivations in PES design aimed at mitigating the possible payments' crowding-out effects. Thirdly, we also contribute to the current state of the art by integrating the notion of plural values to the usual classification of motivations used in PES research. We believe this classification may aid further empirical research on motivation crowding in PES and other conservation-related fields.

Finally, this research supports the view of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (Pascual et al., 2017), regarding the need of integrating plural values in environmental assessment and management. We call attention to the use of extrinsic motivations and instrumental values as the only basis of conservation policies. We suggest, instead, that sustainability transformations will require policies that also integrate people's meaningful relationships (relational values) and moral commitments with nature (intrinsic values).

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Appendix A. Ranking of motivations and values towards forest conservation (n=120)

Motivation	Values	Value expression	Statement	Very Important (%)	Medium important, low important, or non-important (%)	
Intrinsic		Preservation of Life on Earth	I conserve the forest to protect the water which is fundamental for preserving human and non-human life	67,5	32,5	
		Nature's rights	I conserve the forest because animals and plants have the right to live	60,0	40,0	
		Moral obligation	I believe that nature deserves respect and we are obliged to protect it	44,2	55,8	
Intrinsic		Enjoyment	I enjoy and feel happy when I do conservation activities (for example tree planting, bordering of riversides, protection of river sources)	21,7	78,3	
		Aesthetic	I conserve the forest because I like to enjoy the landscape, its colors, smells, shapes, and textures,	13,3	86,7	
		Identity	I conserve the forest because I define myself as an environmentalist	8,3	91,7	
		Sense of place	I conserve the forest because I feel connected to this territory	9,2	90,8	
		Relational	Altruism towards community members	I conserve the forest because my neighbors and the urban people benefit from the ecosystem services generated by this action	6,7	93,3
			Altruism towards family members	I conserve the forest because my family benefits from the environmental services generated by this action	16,7	83,3
			Bequest	I conserve the forest because I want future generations to enjoy it	42,5	57,5
			Recreation/Leisure	I conserve the forest because it is a special space where I can recreate and spend my free time	10,0	90,0
			Social Cohesion	I conserve the forest because it is a space where I can share with my neighbors or other people	0,8	99,2
			Gratitude	I conserve the forest because I want to give back somehow what nature gives me,	22,5	77,5

Motivation	Values	Value expression	Statement	Very Important (%)	Medium important, low important, or non-important (%)
		Sacredness/ religious /spiritual	I conserve the forest because I consider that nature is sacred or has an important spiritual value	29,2	70,8
		Personal growth	I conserve the forest because it allows me to reflect and grow as a person,	9,2	90,8
		Living a Good Life- <i>Buen Vivir</i>	For me a good life implies being in harmony with nature	13,3	86,7
		Reputation- social recognition	I conserve the forest because I like to be positively recognized by those around me and that makes me feel good	5,0	95,0
		Compliance with social norms	I conserve the forest because people close to me do it and they expect me to do it too, and doing so makes me feel good	5,0	95,0
		Knowledge	I conserve the forest because nature is a space that allows me to learn through direct and practical experience	10,0	90,0
		Livelihoods	I conserve the forest because it ensures me and my family the provision of water, food, and materials that are vital for our subsistence	47,5	52,5
		Physical health	I conserve the forest because it regulates the weather, the air, the temperature, contributing positively to my health	44,2	55,8
		Mental and emotional health	I conserve the forest because being in nature generates peace and tranquility	16,7	83,3
Extrinsic	Instrumental	Obtain a monetary or in- kind compensation	I conserve the forest because I will be paid monetary compensation or I hope to receive it	1,7	98,3
		Income Generation from Forest Products	I conserve the forest because it generates natural resources that I can sell or exchange (e.g., food, wood)	3,3	96,7
		Social pressure	I conserve the forest because I feel pressured by my neighbors and acquaintances to do it, and that bothers me	1,7	98,3
		Fines	I will not cut down the forest because I am distressed that I will be fined by the environmental authorities	0,8	99,2

Motivation	Values	Value expression	Statement	Very Important (%)	Medium important, low important, or non-important (%)
		Obligation to comply with other authority regulations	I conserve the forest because I am obliged to comply with the regulations of the environmental authorities and that bothers me	1,7	98,3

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Appendix B. Extracts from the environmental awareness exercise

Exercise # 1

We are going to concentrate on our breath. Let's try to feel how we inhale the air, how is that air? Super pure, clean... We are going to feel how that air enters our nose, travels and enters our lungs ..., Then in the lungs, all that oxygen goes into our blood, and this journey begins throughout our body, it goes through our arteries, oxygenating our entire body. We are going to visualize how that air through our lungs reaches each part of our body, we are going to let ourselves be carried away, and we find that this air oxygenates us and allows us to be alive and more the type of air that we have here in the mountains, it's pure.

Deeply inhale and exhale we are going to relax our body a little bit. We feel how we release the tension in our shoulders. When we exhale, we are going to try to relax, we are going to leave our mind in blank a bit. Let's try to release those recurring thoughts that soon they may be arriving and we are going to connect a little with our sense of hearing, We are going to try to listen to everything that is in our environment ... the wind that brushes the trees ... the little birds ... let's try to take our sense of hearing further ... We have that puppy, over there in the background their other dogs that are answering him. We are going to take our sense of hearing as far as we can ...Can we identify different sounds of birds? How many different little birds can there be in this area at this time?

And we are also continuing to concentrate on our breathing, feeling how that air oxygenates us, allows us to be alive. One of the most important things in life, if it is not a priority, is to breathe and oxygenate our body, without oxygen we cannot live, so it is important to take care of our Nature that helps us clean the oxygen.

Very good. We are going to connect at this moment with a memory, a deep memory, a beautiful memory. It may be a memory from childhood, from adolescence, it may be recent. But let's connect with a place in nature that we love, that we know, that we like to go to that space. It can be a small stream, it can be a mountain, it can be a river, it can be a tree. Let's try to connect with that important memory that makes us more and more connected with nature.

What was happening in that place? Why did it make you feel happy? You played, ran, climbed the tree, lowered fruits, felt the grass with their bare feet. You felt the cold water if you were getting into a small stream, you felt the vertigo of being at the top of the tree if at some point you could climb it. What was that special place for you? Why do you remember it? What happened there? Let's try to remember why that space was so special to us?

We are going to stand up in this place, we are going to look around us, we are going to try to remember as many things that happened in that space ... what was the wind like at that time? What was the weather like? Was it warm? Was it cold?

We continue to connect with the breath, trying to be there, remembering and making that journey through those wonderful natural spaces that allowed us to have fun, standing in that space we begin to feel and see and perceive a butterfly that flutters around us. We are going to imagine what color that butterfly is, and that butterfly begins to invite us to follow it. We begin to walk following that butterfly that is entering a forest. The forest is humid and we begin to see its flora there too, all the species that we can find in that forest. The moss, the humid air, let us feel that space, all the life it embraces, some little animals, little birds, suddenly squirrels ... And we are going to get more and more to the center of that forest and we are seeing everything we find there, all the nature that surrounds us.

We are going to find a small house in the center of that forest ... we find a small, very humble ranch in the center of that forest. We are going to knock on the door and there is someone very important to us waiting for us there, someone who was very important who taught us a lot about the importance to love Nature, of caring for the environment. Maybe it was an uncle, maybe it was grandfather or grandmother, maybe it was dad, maybe is a friend ... And we are going to meet this person inside this little cabin in the forest and we are going to allow ourselves to receive a message from that person, a message of love for Nature ... of Care. Once we have heard this message, we are going to thank that person for giving us this message. We say goodbye and we go out. We leave the cabin; we go back along the little path through which we arrived. We recognize the trees, flowers, vegetation, the different textures and we are feeling how the air is ceasing to be more humid as we leave the forest. And we are going to remember the importance of the message that this person we met gave us. We are leaving the forest, we are feeling the temperature a little warmer, we are seeing the clearing a little more, and once we are outside we are going to look back and we are going to see how beautiful that forest is. We are going to appreciate its majesty, its grandeur and how beautiful it is for all that it offers us..., Remembering that message they gave us there in the little cabin in the forest.

Very good. We are going out, we are reaching the point where we started, we are reconnecting with our breathing, we breathe again, reconnecting with that being that is very committed to the well-being and with nature. We are going back here and now. When I count three we come back here and open the eyes, we will be calm, relaxed and connected with that knowledge and with that information that we receive from our commitment to nature. One two Three... We return now, we return here, we breathe, we return here to the exercise.

Exercise # 2

Welcome. We will then connect again with the breath, we will feel how the air enters through our nose, how it fills our lungs, as when we exhale we can relax our neck and shoulder muscles. We take a deep inhalation and when we exhale, we release all the tension that we

may have there on our shoulders. We are going to become aware of our bodies. How our body is. We are going to become aware of the contact that our feet have on the ground at the moment. How the feet are resting on the ground, if both soles of the feet are touching the floor or just one, or I am supporting it by a little side. How do I feel that contact with the ground, with the earth, we are going to continue the journey and visualize how our visualization rises the ankles? We become aware of our ankles, how our ankles are at this moment. We continue going up through the calves, we reach our knees and we feel our knees. how our knees are? our knees are very important to us, our knees receive the weight, they help us to move, they take us to the places we want to go. How we are with that contact with our bodies? How we take care of our bodies? what food, what hydration? what activities that allow pleasure and enjoyment we are giving to it? how do we connect, How we relate to our own body? We take care of it, we love it, we help it.

We are going to return to the place of anxiety or the place that you found a moment ago in the previous visualization and we are going to recognize how it is now ... how it is now after so many years that space where we played, where we were happy, is the ravine the same? Does it have the same channel? or has it lost its way? Has it dried out a bit? How is the tree we remember? Is it still there? Or have they already cut it down? How is that mountain we played on? Eroded? Suddenly exploited by mining? How are those places in which in childhood we remember them full of green space of nature? How is it now? More beautiful? Greener? or on the contrary, we have lost flora, we have lost fauna. We are beginning to recognize all this negative impact that human beings have on the planet. We are the most important driving force on the planet and we are using it badly. Suddenly we are not using all that force to conserve, to promote a better habitat, greater biodiversity, and care for water and air.

How do we focus again or help the planet a little and specifically this area, this territory, to be better environmentally, because what we are seeing at this moment is an increasingly eroded soil with less vegetation layer that prevents the water is absorbed? That is why many times when it rains very hard on the mountain, we have landslides, and in some cases, it also leads to human losses. Because landslides can leave homes that have sometimes been built in places that have lost their vegetation, and that erosion is also leading to worse and worse air quality, because we do not have the forest to clean that air, we are losing jungle and forest at impressive speeds. The soil of this entire area becomes decertified, which means that the soil is washed away with the rain and our soils are becoming increasingly eroded and without a layer.

How are we cultivating? How many chemicals are we adding to our land? Because then it goes to our body with the food we eat. How is the air? The difference between the air that we breathe here now and the air that may be breathing at this same time in Cali (urban area), downtown, is very different, smells of smog, pollution, garbage in the corners, the river polluted, without fish, without life. Less and less diversity because the little birds no longer

have little trees to grow on, so they stop coming. Species also disappear or migrate to other places as their habitat is removed, we stop seeing them.

This environment that we need so much and without which we cannot live has increasingly deteriorated. What we are doing to take care of it, to protect it. How are we helping to mitigate a little all that climate change issue that is closely connected with risks? What happens if we do not have water? The streams dry up or become contaminated, we have to move to find better water and better air. It is very important to connect with our responsibility, with the responsibility that we have in our hands, with our actions, to achieve a positive impact on a cultural change that improves the natural conditions of our territory. How can we commit to deforestation? How can we help this not to continue happening? The pollution of rivers, air... How are we destroying all ecosystems?

We have seen the news about plastic islands that already exist in the oceans and everything that this implies: whales dying because they can only eat that plastic that is in the sea. What responsibility can we have there? Suddenly we are very far from that impact, but let's think if suddenly we are also contributing to some extent so that this problem continues to grow.

How we see the rivers in Cali. Supposedly we are the city of the 7 rivers, but once they enter Cali, what happens to those rivers? It seems that they become sewage pipes. Where those 7 rivers flow into the Cauca? It is something terrifying, horrible, bubbling black waters, zero life, zero fish... And what about the downstream communities that use those waters For consumption, for cultivation. Thus, are we eating and taking all that contamination?

Well, we are going to reconnect with the here and now, with that opportunity, we have to be the generation of change. We are the first generation that is perceiving and experiencing the effects of climate change, but we are also the first generation with the capacity to transform this situation. For what? So that future generations can count on the resources that we have, what do we want to leave the planet, do we think about leaving a better planet for our children? But it is also important to think that we must leave good children and with a transformation capacity to heal the planet.

We are coming back here and now with this scenario a little sadder, a little more painful, but recognizing that it is in our hands the responsibility to continue contributing positively to this environmental problem that we have in the world and obviously in this area. We are going to think we want to give to our territory? What we want to give our community, to this area, that I could give it myself? or What I could give this area to improve it, to mitigate a little those negative effects that we are seeing that are more frequent every day.

So let's go back, let's connect with the breath and on the count of three we will be here again now, connected with the sense of responsibility for the planet and with a clear idea that I want to give this area, this territory to improve its environmental conditions.
Ready. We are coming back. One, Two, Three.

We go back and we connect again, we breathe, we are here and now.

Appendix C. Participants' socio-economic characteristics

Variable	Description	n	%
Gender	Women	72	60,5
	Men	47	48,9
Last cursod education level	None	6	5,0
	Primary	25	20,8
	Secondary	57	47,5
	Technical/Technological education	24	20,5
	College	5	4,2
	Specialization (post-graduate)	3	2,5
Perform agricultural activities	Performs agricultural activities	68	57,1
	Does not performs agricultural activities	51	42,9
Land Tenure	Informal landlord	27	22,7
	Formal landlord	51	42,9
Forest within the farm/plot	Yes	76	63,3
	No	44	36,7
Community perceptions	My community helps each other a lot	51	42,9
	My community helps each other in some way	56	47,0
	My community do not help each other	12	10,1
Membership to a community organization	Yes	10	8,3
	No	110	91,7
Has participated in environmental projects	Yes	45	37,5
	No	75	62,5
	Yes	10	8,3

Has participated in payment for ecosystem services programs	No	110	91,7
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Appendix D. Models of Ordered Logit Regressions across all treatments

Dep. var = Ha forest Variables	Model (1)			Model (2)			Model (3)		
	Coef.	Std. Error	P-Value	Coef.	Std. Error	P-Value	Coef.	Std. Error	P-Value
period 2 (with PES)	-0,151	0,181	0,406	-0,131	0,185	0,481	-0,121	0,185	0,511
period 3 (post PES)	0,433	0,345	0,210	0,470	0,352	0,182	0,485	0,352	0,168
treatment_PSA	1,096	0,403	*** 0,007	1,064	0,411	** 0,010	0,950	0,386	** 0,014
treatment_PSAS	0,651	0,480	0,175	0,730	0,456	0,109	0,550	0,460	0,231
treatment_PSAR	0,873	0,338	** 0,010	1,230	0,416	*** 0,003	1,060	0,476	** 0,026
treatment_PSA*Stage 2	2,188	0,246	*** 0,000	2,211	0,252	*** 0,000	2,210	0,252	*** 0,000
treatment_PSAS*Stage 2	1,989	0,240	*** 0,000	2,006	0,246	*** 0,000	2,002	0,246	*** 0,000
treatment_PSAR*Stage 2	1,444	0,234	*** 0,000	1,443	0,235	*** 0,000	1,477	0,249	*** 0,000
treatment_PSA*Stage 3	-0,712	0,410	* 0,082	-0,712	0,421	* 0,091	-0,710	0,420	* 0,091
treatment_PSAS*Stage 3	0,486	0,298	0,103	0,516	0,295	* 0,080	0,516	0,295	* 0,080
treatment_PSAR*Stage 3	0,248	0,330	0,451	0,247	0,330	0,454	0,254	0,335	0,448
round	-0,047	0,029	0,106	-0,051	0,030	* 0,091	-0,052	0,030	0,082
Age				1,260	0,370	*** 0,001	1,212	0,374	*** 0,001
gender (fem=1)							0,642	0,327	* 0,050
community organization									
personal income									
No. obs	1800			1770			1755		
No. Clusters	30			30			30		
No. Participants	120			118			117		
Log-Likelihood function	-2176,5			-2132,0			-2116,1		
AIC	4387,01			4300,05			4270,13		
BIC	4480,43			4398,67			4374,06		

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La Facultad de Ciencias Sociales y Económicas de la Universidad del Valle (<http://socioeconomia.univalle.edu.co>) cuenta con el Centro de Investigaciones y Documentación Socioeconómica, CIDSE, creado mediante Resolución 110 del Consejo Directivo de la Universidad, del 3 de abril de 1976.

El CIDSE contribuye al análisis social y económico de Colombia al ofrecer conocimiento, información y análisis sobre la sociedad local, regional y nacional, con especial énfasis en la región suroccidental del país. Contribuye a orientar la toma de decisiones por parte de aquellos actores sociales y políticos que valoren el conocimiento como base de la formulación de propuestas de acción. Potencia la docencia y la investigación para formar profesionales idóneos e incrementar el capital humano de la región y el país. El Centro como parte de una universidad estatal, se identifica con los intereses generales de la nación colombiana, procura el interés público y defiende metas colectivas universalistas, a partir de la cultura académica.

Como centro de pensamiento, sus investigadores se nutren de los desarrollos académicos de frontera, intercambian con pares nacionales y extranjeros, aportan a la expansión del conocimiento y lo aplican en la investigación de problemas propios del entorno a través de sus grupos de investigación: Acción Colectiva y Cambio Social; Economía Regional y Ambiental; Conflicto, Aprendizaje y Teoría de Juegos; Desarrollo Económico, Crecimiento y Mercado Laboral; Estudios Étnico-Raciales y del Trabajo en sus diferentes componentes sociales; Sociedad, Historia y Cultura; Macroeconomía Aplicada y Economía Financiera.

El CIDSE ha tenido presencia activa en el análisis socioeconómico regional, reconocimiento por su labor de asesoría al sector público y empresarial del suroccidente colombiano, ha sido catalogado como Centro de investigación de excelencia por COLCIENCIAS y goza, igualmente, del reconocimiento de la comunidad académica nacional del área de las ciencias sociales y económicas como uno de los mejores centros de investigación nacionales en su campo.

A lo largo de su historia, el Centro ha publicado varios libros e informes, una antigua revista que llegó hasta la edición número 31, llamada Boletín Socioeconómico, y actualmente edita dos publicaciones periódicas: El Observador Regional y la serie de Documentos de Trabajo, además de contribuir a la publicación de Sociedad y Economía, revista de la Facultad de Ciencias Sociales y Económica de la Universidad del Valle. En el año 2006 el CIDSE recibió la Orden al Mérito Vallecaucano en categoría al Mérito Científico y en el grado de Caballero de la Gobernación del Valle del Cauca.