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# Inducing perspective-taking for prosocial behaviour in natural resource management

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**Abstract:** Natural resource management often involves social dilemmas. Institutional and behavioural economics have shown that other-regarding preferences and pro-social behaviour can help overcome such dilemmas. Interventions that induce resource users to consider a perspective broader than their own may then be useful to promote and strengthen pro-social behaviour. Such interventions are often applied in participatory resource management approaches. To the best of our knowledge, nonetheless, no previous study has systematically assessed the effect of induced perspective-taking on resource users' prosocial behaviour in a controlled manner. In this study, we do so in the context of watershed management. We conducted a lab-in-the-field experiment with downstream farmers in a Peruvian watershed. In the experiment, farmers were induced to imagine the perspective of upstream farmers before deciding on a donation that can help these upstream farmers improve their wellbeing without compromising the water supply downstream. We find that induced perspective-taking increases prosocial behaviour. This effect cannot be explained by the additional information on the social and ecological characteristics of the watershed received during the perspective-taking experience, nor by an 'experimenter demand effect'. Rather the effect of the perspective-taking intervention is likely to work via an activation or strengthening of other-regarding preferences. Our results contribute to the study of pro-social behaviour and the ways it could be induced by interventions targeting other-regarding preferences.

**Keywords:** perspective-taking, prosocial behavior, other-regarding preferences, social dilemmas, natural resource management, environmental policy, framed field experiment.

**JEL:** D01, D64, D91, C93, Q25, Q57

## Highlights:

- We conducted a framed lab-in-the-field experiment with downstream farmers in a Peruvian watershed.
- We assess the effect of inducing perspective-taking on downstream farmers' prosocial behaviour towards upstream farmers.
- Induced perspective-taking is found to promote prosocial behaviour.
- The effect is likely to be produced by the activation of other-regarding preferences.

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## 1. Introduction

Many environmental problems involve social dilemmas; that is, situations wherein individual self-regarding interests are at odds with societal goals. Institutional and behavioural economic analyses of social dilemma situations have shown that individuals make choices based not just upon self-regarding, but also on other-regarding preferences (Ostrom 2005; Fehr and Schmidt 2006; Poteete et al. 2010; Bosworth et al. 2016; Bowles 2016). Tapping other-regarding preferences and promoting pro-social behaviour can, therefore, contribute to resolving such dilemmas (Fehr and Schmidt 2006; Cárdenas 2018). In particular, inducing individuals to go beyond their own perspective in their decision-making may encourage at least some of them to act pro-socially. By considering their broader context and the perspective of the others involved, individuals may recognise mutual interdependencies and take action in favour of the others whose perspective is considered.

Perspective-taking is defined as the act of going beyond one's own vantage point to consider a given situation from another actor's perspective (Epley and Caruso 2009; Ku et al. 2015).<sup>3</sup> Research in the field of natural resource management suggests that inducing perspective-taking would contribute to attaining better collective results in terms of policy and ecological indicators. This would be particularly the case in settings like water resources systems characterised by sharp asymmetries and mutual dependencies among resource users (Ostrom and Gardner 1993; Pahl-Wostl and Hare 2004; Gurung et al. 2006; Lejano and Ingram 2009; Lubell and Lippert 2011). In fact, interventions that induce perspective-taking are often applied in participatory resource management approaches (Pahl-Wostl and Hare 2004; Medema et al. 2016; Cárdenas and Ortiz-Riomalo 2018). Nevertheless, to the best of our knowledge, no previous research has systematically assessed in a controlled manner the effects of inducing perspective-taking on the pro-social behaviour of actual resource users in a natural resource management setting. In this study, we do so in the context of watershed management.

Experimental research in social psychology (e.g. Batson and Moran 1999; Epley et al. 2006; Epley and Caruso 2009; Erle and Topolinski 2017) and economics (e.g. Andreoni and Rao 2011; Czap et al. 2015), on the other hand, has been able to establish neater connections

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<sup>3</sup> This perspective-taking can be caused by, for instance, being induced to imagining the other's vantage point or imagining oneself in the other person's shoes (e.g. Davis 1996; Batson et al. 1997; Erle and Topolinski 2017), or by role-playing techniques (e.g. Carlson-Sabelli 1989; Deutsch et al. 2006; Pahl-Wostl and Hare 2004). In any case, perspective-taking would lead an actor to think about the intentions, expectations, emotions and/or circumstances of another (Davis 1996; Ku et al. 2015).

between induced perspective-taking and changes in pro-social behaviour. According to this research, whether inducing perspective-taking triggers or hinders pro-social action fundamentally depends upon the procedures used to induce perspective-taking as well as the situation and context where these procedures take place (Davis 1996; Batson et al. 1997; Epley et al. 2006; Ku et al. 2015). The conclusions of these studies, nevertheless, are primarily undergirded by data collected from students in US colleges and universities. Furthermore, in most of the relevant studies, i.e. studies conducted in relevant economic situations, the effects attributed to induced perspective-taking could arguably be confounded with factors like role uncertainty<sup>4</sup> (e.g. Andreoni and Rao 2011; Zhan et al. 2017), one-way structured communication (e.g. Czap et al. 2015) and incentives to act strategically in social dilemma situations (e.g. Epley et al. 2006; Wald et al. 2017). Our study aims to isolate the effect of perspective-taking by controlling for these factors.

To contribute to bridging these research gaps, we systematically assessed the potential of inducing perspective-taking to bring about pro-social behaviour in a natural resource management context. For that purpose, we conducted a framed lab-in-the-field experiment that controlled for the influence of relevant individual, situational and contextual factors. We evaluated the impact of induced perspective-taking on the prosocial behaviour of actual natural resource users making decisions in a social dilemma situation within their natural environment.

In the Andean watershed context wherein our experiment takes place, communities of low-income traditional-style upstream farmers help provide water-related ecosystem services downstream that benefit farmers in the lower watershed who tend to be relatively better off anyhow. An agroecological fair has been proposed by the landscape reserve and the community organisations of the upper watershed to help upstream farmers improve their livelihoods without compromising water provision downstream. Hence, donating to the fair can be considered as a pro-social action, an instance of prosocial behaviour, in favour of a socially desirable social-ecological outcome. In our framed lab-in-the-field experiment, we induced downstream farmers in the watershed to imagine the thoughts, feelings and expectations of upstream farmers before deciding about a possible donation to establishing an agro-ecological fair in the upper watershed. We examined whether the induced perspective-taking increases downstream farmers' donations to the fair.

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<sup>4</sup> The effect of having participants making payoff-relevant decisions before knowing the role/position they would end up playing during the game/experiment (Iriberry and Rey-Biel 2011).

Because downstream farmers collectively may also benefit from the continued provision of watershed services, the mere information provided as part of the perspective-taking intervention could affect the donations of downstream farmers. Thus, we also test whether a control treatment where the same information is provided without induced perspective-taking also affects pro-social behaviour. In addition, our experimental design allowed us to control for other factors that may have influenced the effects attributed to perspective-taking in previous studies. In our setup, roles of participants were decided upfront and remained unaltered, and communication among farmers was not permitted. Also, no (formal) incentives for strategic interactions existed insofar as the giving decision was unilateral and all decisions were anonymous (Forsythe et al. 1994; Smith 1998; Levitt and List 2007; Vorlauffer 2019).

We find that induced perspective-taking has a significant effect on pro-social behaviour, beyond the mere effect of providing information. We sustain that this effect can be explained by the activation or strengthening of other-regarding preferences. The effect also holds when controlling for farmers' socioeconomic traits, and cannot be attributed to so-called 'experimenter demand effects' (Zizzo 2010). Our study contributes to sorting out the effect of induced perspective-taking and assess its potential in an actual natural resource management setting. It underscores the potential of environmental policy interventions that recognise and activate (or strengthen) other-regarding preferences to produce pro-social action for natural resource management. These types of interventions have the potential to enrich the toolkit of environmental policy and complement other approaches such as economic incentives which tend to rest on assumptions of purely self-regarding human behaviour.

The remainder of the paper is structured as follows. Firstly, in the next section (Section 2) we present the characteristics of the case in which we conducted our experiment, and describe the experiment design and procedures thereafter. In Section 3 we spell out the specific research hypotheses, and in Section 4 we report the results. Section 5 discusses possible alternative interpretations as well as the implications and limitations of our results; this section concludes the paper.

## **2. Data and methods: experiment design and procedures**

In this section, we present and describe the general context in which the experiment took place as well as the main features of the experiment design and procedures. For detailed descriptions of these, see Appendix A and Appendix B. Appendix A also includes the

experiment instructions, and all materials from the experiment are available as supplementary material upon request. Towards the end of this section, Table 1 summarises the main features and steps of the experiment.

### **2.1. The case: an Andean watershed**

Our experiment took place in the Cañete River Watershed, one of the most stable water sources in Peru (Stern and Echavarría 2013), located in the Lima region, southeast of the Peruvian capital. Similar to other places in the Andean region, water rises in high mountain ecosystems and feeds agricultural land irrigation in the lower watershed. Whereas the clean water supply primarily benefits farmers downstream, the costs of the provisioning activities like conservation measures are generally borne by low-income communities upstream (Quintero et al. 2013; Francesconi et al. 2016, 2018).

The stable water supply enables the farmers to transform their land into fertile soil while the proximity to Lima and Cañete as well as access to roads along the Pacific coast facilitate commercialisation of their agricultural products. Farmers in the upper watershed, on the other hand, face hardships such as limited access to a stable supply of water, as well as limited access to markets and poor infrastructure. In 2017, the average percentage of households living with at least one unsatisfied basic need was 47.44 % in the ten upstream districts where most of the water flow is sourced (Quintero et al. 2013; INEI 2020). In contrast, the average proportion of households living with at least one unsatisfied basic need was 23.33 % in the districts that benefit the most from a stable and sufficient water supply downstream (i.e. Cañete province) (INEI 2020). This contrast, in which water supply is sourced and water flow is regulated upstream while the benefits of the stable water supply are harvested downstream, is also typical of many other watersheds in Peru and in the Andean region.

To contribute to redressing these imbalances between the lower and upper regions of the Cañete River Watershed, the community leaders and the management committee of the *Nor Yauyos Cochis* Landscape Reserve (RPNYC) in the upper watershed have proposed organising an agroecological fair.<sup>5</sup> The fair is to be organised during the tourist seasons in the landscape

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<sup>5</sup> The RPNYC is a protected nature area in Peru. It seeks to guarantee the protection and sustainable management of the landscapes in the upper watershed that underpin key sociocultural and socioeconomic activities upstream and the provision and regulation of water in the watershed (RPNYC 2016). The managing committee of the RPNYC encompasses representatives of the political authorities and community organisations from the different administrative districts within the landscape reserve.

reserve to help upstream farmers market their products. Only farmers using organic methods and observing the land management regulations of the landscape reserve are eligible to join the fair. These regulations are intended to preserve the critical nature areas for water provision. Hence, the fair is set to secure the livelihoods of upstream farmers and possibly expand their incomes without compromising water provision and water regulation downstream.

## **2.2. The choice task**

Upon arrival to the session, downstream farmers received PEN S/16 (sixteen Peruvian soles ~ €4.50), in PEN S/1 coins. This endowment was presented to farmers as compensation for travelling to the venue and attending a two-hour meeting to share their opinions and perceptions about the agriculture in Cañete with the research team from Osnabrueck University.<sup>6</sup>

In each session, the farmers had to decide whether they wanted to transfer all or part of their endowment to the agroecological fair described in the previous sub-section above. They were asked to choose an integer between PEN S/0 and PEN S/16 to donate to the fair. All farmers across treatment and control conditions received the same basic information about the purpose, aim and rules of the fair. Furthermore, farmers were informed that their decision was anonymous and that there was no right or wrong decision. They were also informed that the money would be collected by the research team and directly handed to the organisers of the fair to help them establish the fair. Both the general instructions for this task and the general information on the agroecological fair were presented by the experimenter to all farmers at the beginning of the session—instructions were read out loud using slides for visualization (see Table 1, Appendix A for details).

## **2.3. Information on the social and ecological conditions of the watershed**

In two of our treatments, a short video clip (4'25'') was presented to the downstream farmers before their choice task outlined above. The video introduces and describes the main ecological features and functions of the watershed, highlights that water provision is the central service provided in the watershed, and describes the agricultural activities of the lower

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<sup>6</sup> As explained to the farmers (see Appendix A and Appendix B), the PEN S/16 amount was to acknowledge the effort made to attend the session in terms of time spent, transportation costs afforded and information shared. This was emphasised to them during the call of participants and the experiment sessions. To calculate this amount, we primarily took into account the information on average daily income reported by farmers during the pilot interviews.

watershed that are reliant upon this water provision. It includes original footage of the ecosystems in the upper watershed and of the agriculture in the lower and middle watersheds. In the video, upstream farmers describe their activities, the challenges they face, the agroecological fair and the contributions of the fair to meeting the challenges their activities face.<sup>7</sup>

#### **2.4. The treatment condition: Perspective-taking procedures**

Before viewing the video, downstream farmers in our treatment condition (*Info + Video + Perspective-taking*) were instructed to watch the video from the perspective of the upstream farmers. Specifically, farmers were instructed to imagine the thoughts and feelings of people living upstream in the situation depicted in the video. That is, we followed an ‘imagine-other’ protocol to induce perspective-taking (Davis 1996; Batson et al. 1997).<sup>8</sup>

Also in line with this protocol, after watching the video downstream farmers were instructed to imagine how much of their PEN S/16 endowment the upstream farmers would like to receive. They were asked to write down, in a half-page format, the amount they think upstream farmers would like to receive and the reasons for their answer. They performed this exercise in a private booth located in a room resembling the upper watershed, different from the room wherein the main instructions were received and the room wherein the choice task was conducted. We labelled this room, in Spanish, as “Parte alta de la cuenca” (i.e. upper watershed).

#### **2.5. Control conditions**

The video may influence farmers’ decisions in the choice task purely by the new information it provided. In other words, it could be that simply watching the video without engaging in perspective-taking tasks may also increase pro-social behaviour. This could be due to the additional information on living conditions upstream or because seeing upstream farmers in the video induced downstream farmers to automatically consider upstream farmers’ perspectives. It could also be because downstream farmers realise through the video that they

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<sup>7</sup> [Link to the video; online resource blinded for review process, available upon request.]

<sup>8</sup> In the literature, there have been two general modes of inducing perspective-taking (Davis 1996; Batson et al. 1997). Firstly, decision-makers could be instructed to imagine how they would feel if they were experiencing the other’s position in a given situation (so-called ‘imagine-self’ instructions). Secondly, they can be instructed to imagine how the other feels in a given situation (so-called ‘imagine-other’ procedures). We followed the latter approach.



may collectively benefit from contributing to the continued provision of watershed services. Hence, the information provided as part of the perspective-taking intervention could affect the donations of downstream farmers. To assess whether the perspective-taking procedures really had an additional effect beyond the information in the video, we conducted one control condition (*Info + Video*) in which we only played the video. In this condition, we instructed farmers to pay attention to all (factual) information provided in the video.

To isolate the effects of the video and the perspective-taking procedures, we included an additional control condition (*Info only*). In this condition, farmers received only the general information on the fair that all participants received with the general instructions read out loud by the experimenter at the beginning of the experiment. Neither the video was displayed nor were the perspective-taking procedures carried out. Table 1 summarizes our procedures and highlights the main differences between the treatment and control conditions.

## **2.6. Variables measured**

As indicated above, and similarly to other studies on dictator games (Engel 2011) and donations to charity (Vesterlund 2016), we used the amount donated to the agroecological fair as a measurement variable for prosocial behaviour. In a complementary pre- and post-experiment, three-part survey we additionally elicited data based on variables which are suggested as covariates by the relevant literature (Engel 2011; Vesterlund 2016). The full questionnaire is available as supplementary material upon request. Here we only present the critical variables we considered in our analysis.

In the first part of the survey we asked about the age, gender and education level of the participants. We also asked about their transportation costs to come to (and return from) the venue (as a proxy for opportunity costs) and about the irrigation canal they belonged to. To check for possible peer-contagion effects, we asked farmers about the way they were invited to the experiment. Lastly, we asked whether they were the head of their respective households. Through the second part of the questionnaire we elicited farmers' perception of their socioeconomic distance to as well as of their closeness with upstream farmers (i.e. the Inclusion of the Other in the Self Scale; Gächter et al. 2015). In the third part of the survey we asked whether they are the person managing the plot where they work and about the tenure of the land they cultivate.

## 2.7. General procedures

We followed a between-subject design in our experiment. General procedures were the same across conditions, following the steps listed in Table 1 and described in detail in Appendix A. All sessions were conducted at the same venue, with the same setup, in San Vicente de Cañete (district capital of Cañete province, where Cañete valley is located; we describe and present pictures of the setup in Appendix A3). Treatments were assigned at the session level balancing allocation to treatment over days and time of day (see plan of sessions and details on the assignation-to-treatment procedures in Appendix B).

All materials required for the session were handed out at the beginning of the session. Upon arrival, one member of the research team—not involved in the other procedures of the tasks—welcomed and registered each farmer. Subsequently, another team member—not involved in the other procedures of the tasks either—handed out the materials: a white bag containing the PEN S/16 endowment in PEN S/1 coins marked with the Spanish word “Suyo” (“yours”), an empty yellow bag marked with the Spanish word “Feria” (“fair”), a blue envelope containing the half-page form for the perspective-taking task (only for those in the *Info + Video + Perspective-taking* condition) and the three-part questionnaire. Farmers could start to answer the first part of the questionnaire while waiting for the experiment to begin.

To assure anonymity in the field setting, these general procedures closely follow Vorlauffer (2019). Hence, each task was simultaneously performed by downstream farmers in private booths located in two different rooms. The booths for the choice task were located downstairs, in a room resembling the lower watershed and labelled, in Spanish, as “Parte baja de la cuenca” (“lower watershed”). After making their choice, farmers were asked to leave the yellow bag (“Feria”, “fair”), empty or with their donation, in the booth. The booths for the perspective-taking task were located upstairs, in the aforementioned room that resembles the upper watershed. In these booths, farmers left the blue envelopes with their answers in the half-page form.

After receiving the instructions in the main room, downstream farmers assigned to the control groups (i.e. *Info only* and *Info + Video*) moved directly to the room downstairs to perform the choice task. Farmers assigned to the treatment groups (*Info + Video + Perspective-taking*) moved first to the room upstairs to perform the perspective-taking task before

proceeding to the room downstairs to perform the choice task. Farmers were not allowed to talk to each other during the experiment. Each session lasted two hours on average.

Note that the implemented procedures minimize the likelihood of a possible ‘experimenter demand effect’.<sup>9</sup> In particular, participants were not informed about the objectives and procedures of the experiment upfront, the anonymity of their decisions was preserved throughout the entire experiment and the authors of the paper were not involved either in the reading of the instructions of the experiment or in the implementation of the choice and perspective-taking tasks during the experiment sessions.

**Table 1**  
Experimental setup and timeline of an experimental session.

Key steps of the experiment	Conditions		
	Control 1 <i>Info only</i>	Control 2 <i>Info + Video</i>	Treatment <i>Info + Video + Perspective-taking</i>
Downstream farmers register and receive the materials for the session.	X	X	X
Farmers fill in the first part of the survey.	X	X	X
Start of the session and welcome: - General information on the project. - Signature of informed consent and receipt.	X	X	X
Instructions to pay attention to all information about the watershed presented in the video.		X	
<b>Perspective-taking instructions:</b> Instructions to imagine the thoughts and feelings of upstream farmers while watching the video about the watershed.			X
<b>Video</b> about the ecological and socio-economic conditions of the watershed.		X	X
General information on the agroecological fair and instructions for the choice task.	X	X	X
<b>Perspective-taking task:</b> Farmers go to the booth located in the room resembling the upper watershed and write down what they imagine upstream farmers would like them to donate.			X
<b>Choice task:</b> Farmers go to the downstream booth and decide whether to donate to the fair and, if so, how much.	X	X	X
Farmers fill in the second and third parts of the survey.	X	X	X

<sup>9</sup> Changes in behaviour due to social and cognitive cues about what constitutes appropriate behaviour in an experiment (Zizzo 2010)

## 2.8. Sampling

For sampling, we visited downstream farmers at their plots or homes inviting them to participate in a research activity. We gave them the basic and general information about the activity—location, duration and date of each session—and the compensation they would receive. We invited and registered all farmers we met during daily visits to the townships and plots where farmers were working or both living and working. We primarily visited small- and medium-scale farmers (1ha – 5ha) from the head, the middle section, and the tail-end of an irrigation canal, and we visited all seven irrigation canals (for further details on the sampling procedures, see Appendix B). We focused on small- and medium-scale farmers since they constitute the majority of farmers in Cañete Valley (about 70% – 80% of the total).

678 farmers were registered in total. With a turnout rate of 27%, and after subtracting three invalid observations, our dataset comprises data from 177 farmers.<sup>10</sup> In total, 38 experiment sessions were carried out between January 22 and February 17, 2019. Assignment to treatment and control conditions took place at the session level. Together with the assignment-to-treatment procedures, the sampling procedures and the full plan of sessions are presented and explained with more detail in Appendix B. In Appendix C (Section C1) we present, by treatment and control conditions, the data on the socioeconomic characteristics of farmers that we elicited with the survey and controlled for in the data analysis. As discussed in Appendix B and Appendix C, the data and our analyses indicate that the assignment-to-treatment process was successful in allocating farmers to treatment and control groups in a fairly balanced manner; farmers' characteristics do not bias or influence the treatment effects.

## 3. Hypotheses

Based on the reviewed literature, we expect that **inducing downstream farmers to consider the perspective of upstream farmers results in higher donations to the fair (H1)**. The reason is that we expect that induced perspective-taking prompts downstream farmers to behave more prosocially towards upstream farmers by activating or strengthening other-regarding preferences. *Imagine-other* instructions, employed in our experiment, have been

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<sup>10</sup> 182 farmers showed up to the experimental sessions. Of these, two farmers left the venue without leaving any of the choice task bags in their booths and data from the fourth session ( $N = 3$ ) is left out due to a mistake in the implementation of the procedures during this experiment session.

previously associated with positive effects on prosocial behaviour (e.g. Batson et al. 1997; Ku et al. 2015).

We also hypothesise that **the effect of inducing-perspective-taking on prosocial behaviour is not fully accounted for by the additional information contained in the video of the watershed (H2)**. That is, we expect the *Info + Video + Perspective-taking* treatment to have a significantly stronger effect on prosocial behaviour than the *Info + Video* control.

Note that these hypotheses presume that downstream farmers hold situation-dependent other-regarding preferences (Sen 1970, 1997; Ostrom 2005; Levitt and List 2007; Bowles and Polanía-Reyes 2012; Dhimi 2016). Although we briefly discuss the possible behavioural mechanisms that may explain our findings in the last section of the paper, a systematic theoretical or empirical assessment of these mechanisms is beyond the scope of this paper.

#### 4. Data analyses and results

To test our first hypothesis (H1), we compare the distribution of the outcome variable between the treatment condition (*Info + Video + Perspective-taking*) and the first control condition (*Info only*). To test our second hypothesis, we compare the distribution of the outcome variable between *Info + Video + Perspective-taking* and the second control condition (*Info + Video*). In both cases, we first compare the summary statistics of the outcome variable across conditions and complement these descriptive comparisons with non-parametric tests. In a second step, we use regression analysis to complement the assessment of both hypotheses. For a result to be considered statistically significant, we set *ex ante*  $p < 0.05$  as the critical threshold.

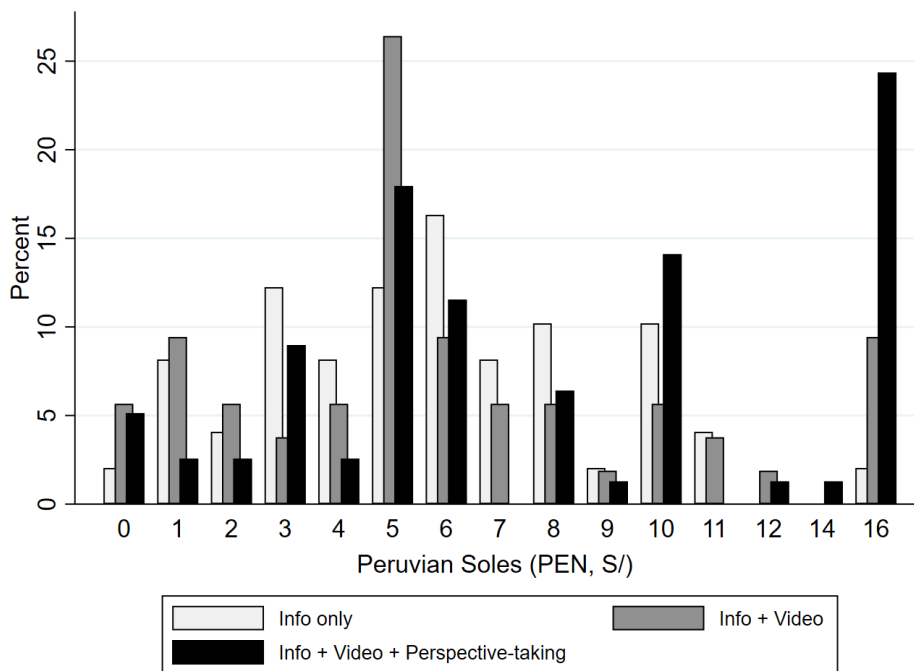
**Table 2**

Summary statistics of outcome variable (amount donated to the agroecological fair).

<b>Condition</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>p25</b>	<b>Median</b>	<b>p75</b>	<b>Min</b>	<b>Max</b>
Control 1 <i>Info only</i>	49	5.82	3.24	3	6	8	0	16
Control 2 <i>Info + Video</i>	53	6.17	4.34	4	5	8	0	16
Treatment <i>Info + Video + Perspective-taking</i>	75	8.48	5.25	5	8	16	0	16
<b>Total</b>	<b>177</b>	<b>7.05</b>	<b>4.64</b>	<b>4</b>	<b>6</b>	<b>10</b>	<b>0</b>	<b>16</b>

**Notes:** our outcome variable is prosocial behaviour measured by the amount donated (in Peruvian soles; PEN, S/) to the agroecological fair. **SD** indicates standard deviation, **N** the number of observations, and **p25** and **p75** indicate the 25<sup>th</sup> and 75<sup>th</sup> percentiles, respectively. **Min** and **Max** indicate the minimum and the maximum values of the outcome variable.

Table 2 presents descriptive statistics on our outcome variable. These suggest that farmers in *Info + Video + Perspective-taking* behaved more prosocially than farmers in *Info only*. The mean donation of farmers in the Treatment condition is 1.46 times higher than the mean donation of farmers in the control condition. Whereas 75% of the farmers in *Info only* ( $N = 37$ ) donated no more than half of their total endowment (i.e. PEN S/8), 50% of the farmers in *Info + Video + Perspective-taking* donated half of their endowment or more (see also Figure 2). Only 2% of farmers ( $N = 4$ ) in *Info only* donated their entire endowment. In contrast, 24% ( $N = 16$ ) of farmers in the *Info + Video + Perspective-taking* condition did so. These differences are statistically significant. Support for this result is, in the first place, provided by non-parametric tests comparing the distributions of the outcome variable in *Info + Video + Perspective-taking* and *Info only*; these distributions are indeed significantly different from each other (Mann-Whitney test:  $z = -2.494, p = 0.0126$ ; Kolmogorov-Smirnov test:  $D = 0.2634, p = 0.026$ ).



**Figure 1. Donations to the agroecological fair, by condition.** The figure displays the frequencies (percentages) of the amounts donated to the agro-ecological fair for each of our three conditions.

As a second step, we probe the robustness of this finding with a regression analysis, following a Tobit specification.<sup>11</sup> We regress the amount donated to the fair on a dummy

<sup>11</sup> Figure 1 indicates censoring of the data in the upper limit of the outcome variable (donation to the fair). Further, evidence on the dictator game indicates that decision-makers are willing to transfer negative amounts when provided with the opportunity to take money from recipients (List 2007; Bardsley 2008). For this reason, we

variable indicating whether or not the corresponding farmer was assigned to the treatment condition (i.e. to *Info + Video + Perspective-taking*). We first do so including only the data from the treatment condition and the *Info only* control (Model 1 in Table 3). In addition, we control for relevant covariates (Model 2 in Table 3). In both cases, the results indicate that there are statistically significant average treatment effects. Hence, the procedures we followed to induce perspective-taking in the experiment can be associated with a significant increase in the average amount donated to the fair. In summary, we have

**Result 1:** *Inducing downstream farmers to consider the perspective of upstream farmers is significantly associated with higher donations to the fair.*

**Table 3**

Results of Tobit estimations.

Independent variables	Outcome variable: amount donated to the agroecological fair			
	Model 1	Model 2	Model 3	Model 4
<b>Perspective-taking</b>	<b>3.224***</b> [1.335, 5.112]	<b>4.841***</b> [2.341, 7.341]	<b>2.781***</b> [0.707, 4.856]	<b>3.095**</b> [0.287, 5.903]
<b>Video</b>			<b>0.417</b> [-1.295, 2.128]	<b>0.891</b> [-1.803, 3.585]
Control variables included	No	Yes	No	Yes
No. of observations	124	100	177	136
Pseudo R2	0.01	0.07	0.01	0.04

**Notes:** Tobit models were estimated assuming lower and upper censoring and calculating robust standard errors. Confidence intervals (95%) in squared brackets. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. **Perspective-taking** indicates whether downstream farmers were induced to perspective-taking and **Video** indicates whether downstream farmers watched the video of the watershed. **Control variables** account for downstream farmers' socioeconomic characteristics (i.e. age; transportation costs; daily income; perceived social distance and perceived economic distance with upstream farmers; dummy variables for gender, head of household, plot management, plot ownership, previous visit to the upper watershed, irrigation canal and way of finding out about the experiment). Model 1 and Model 2 only consider the data of farmers in *Info only* and *Info + Video + Perspective-taking*. Model 3 and Model 4 consider the data of all farmers. The number of observations is lower in Model 2 and Model 4 due to missing observations on control variables. Appendix C presents the complete results of these estimations and addresses concerns on the possible endogeneity of the variables measuring perceived social distance (in brief, based on our results, they are not to be considered as endogenous variables in the model).

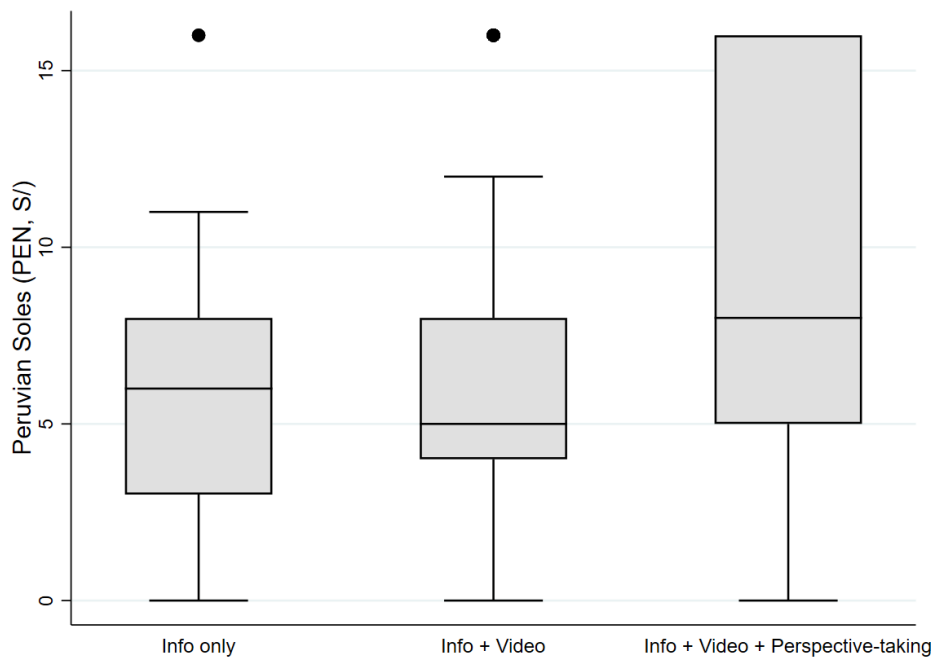
From these results, nonetheless, we cannot conclude that it is solely the inducement of perspective-taking that triggers prosocial behaviour. In *Info + Video + Perspective-taking* the effects of inducing perspective-taking are mingled with the possible effects triggered by the information in the video about the watershed. One way to sort out the sole effect of inducing perspective-taking is by comparing the (distribution of the) outcome variable between the

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follow a Tobit approach as illustrated by Moffat (2016) with data from a dictator game experiment. We assume censoring in both the upper and the lower limit. However, the statistical significance of the results does not change if we follow an OLS approach. Complete results of both estimations are included in Appendix C.

treatment *Info + Video + Perspective-taking* and the *Info + Video* control condition. The active inducement of perspective-taking, which did not take place in *Info + Video*, is the only aspect in which these conditions differed. Therefore, differences in the outcome variable can be attributed to the inducement of perspective-taking in the treatment condition. We again used regression analysis to control for potential differences in observable characteristics of farmers that might also influence the variance of the amount donated to the fair.

The descriptive statistics reported in Table 2 support our second hypothesis (H2). They suggest that prosocial behaviour among the farmers in *Info + Video + Perspective-taking* was higher than the prosocial behaviour of the farmers assigned to *Info + Video*. The mean donation of farmers in the treatment condition is 1.37 times higher than the mean donation of farmers in *Info + Video*. As already mentioned, half of the farmers ( $N = 38$ ) in *Info + Video + Perspective-taking* donated half of their endowment or more, and 24% ( $N = 16$ ) donated their total endowment. In contrast, only 25% ( $N = 13$ ) of farmers in *Info + Video* donated half of their endowment or more and just 9% ( $N = 5$ ) donated their total endowment. Figure 2 mirrors these patterns, showing clear differences in prosocial behaviour between the treatment and the second control group. As it stands, a visual inspection of the data indicates that downstream farmers who were actively induced to take on the perspective of upstream farmers acted more generously than farmers who only watched the video with the instruction of paying attention to the information contained in the video.



**Figure 2.** Box plot of the amount donated to the agroecological fair, by condition.



These differences suggest that there is more to the inducement of perspective-taking than gaining simply new information and acting upon it; inducing downstream farmers to imagine and consider the perspective of upstream farmers seems to have in and of itself an effect on prosocial behaviour. Based on the results of non-parametric tests, it is not possible to maintain that the distributions of the outcome variable in *Info + Video + Perspective-taking* and *Info + Video* are the same (Mann-Whitney test:  $z = -2.4384$ ,  $p = 0.0148$ ; Kolmogorov-Smirnov test:  $D = 0.2236$ ,  $p = 0.074$ ).

To test the robustness of this result, we regress the amount donated to the agroecological fair on the two independent variables of our interest. The first variable (*Perspective-taking*) indicates whether or not the downstream farmer received the treatment. The second variable (*Video*) indicates whether the farmer watched the video of the watershed during the experiment. We estimated two models: one in which we only regressed the outcome variable on the two central independent variables and a second one in which we additionally included farmers' socioeconomic characteristics (see Models 3 and 4 in Table 3, respectively). These models now use the full data set from all three conditions.

To assess our second hypothesis, we focus on the coefficient accompanying the *Perspective-taking* variable. The results indicate that this coefficient is positive and significantly different from zero in both Model 3 and Model 4. These results thus confirm that our perspective-taking procedures can be associated with a significantly higher average amount donated to the fair, beyond the effect of merely watching the video. In fact, the coefficient on *Video* is not significant, indicating that the video itself did not significantly affect behaviour. In summary, we have

***Result 2:*** *The effect of inducing-perspective-taking on prosocial behaviour is not accounted for by the information conveyed in the video.*

## **5. Discussion and conclusion**

The data of our experiment in a Peruvian watershed show that downstream farmers who were induced to consider the perspective of upstream farmers behaved more prosocially than farmers who were not. They were more willing to contribute to an initiative that would favour the livelihood of upstream farmers without compromising water provision downstream. Our research design and our analysis allow us to conclude that the observed differences in behaviour can in fact be attributed to the procedures we employed to induce perspective-taking.

Neither the information provided during the perspective-taking procedures nor the socioeconomic characteristics of farmers can fully account for the observed behavioural differences between treatment and control groups. All in all, these results indicate that inducing perspective-taking could in fact promote pro-social behaviour; it could help attain socially desirable social-ecological outcomes in situations and contexts characterised by social dilemmas and heterogeneous actors (Ostrom and Gardner 1993; Cardenas et al. 2011; Shogren and Taylor 2008; Poteete et al. 2010; Gsottbauer and van der Bergh 2011).

It is plausible that the observed increase in pro-social behaviour is predominantly due to strengthened or activated other-regarding preferences. It could also be that induced perspective-taking reduces the perceived social distance of downstream farmers towards upstream farmers. However, our data suggests that the social distance between upstream and downstream farmers, as perceived by downstream farmers, was not significantly influenced by the perspective-taking procedures (see Appendix C3.1).

Downstream farmers may have also donated to the fair out of other motives, such as self-interest or concern for their own community of downstream farmers. Specifically, farmers could have realised that supporting conservation-related initiatives upstream contributes to securing water provision downstream, and could have decided to donate to the fair thereupon. Within the treatment condition, it is the information on the fair and the watershed contained in the video what may induce such concern for water provision downstream. The rest of the perspective-taking procedures instruct participants to consider upstream farmers' perspectives, thus appealing to downstream farmers' other-regarding preferences for the upstream farmers. When we control for the possible effects of the video, the procedures aimed at inducing perspective-taking in themselves are found to cause a significant, positive effect on prosocial behaviour, while the video alone had no significant effect. Thus, self-interest or concern for their own community may explain baseline cooperation in the control settings, but does not explain the impact of the perspective-taking procedures. For that reason, we sustain that the additional effect of the perspective-taking procedures is due to the activation or strengthening of other-regarding preferences toward upstream farmers.

In a similar fashion, we can rule out that the observed results are altogether driven by so-called 'experimenter demand effects' (Zizzo 2010). If our instructions contained any (subtle) indication that it should be appropriate for participants to donate to the fair, such a request was present within the basic information on the fair and the 'choice task' we presented participants

with in both treatment and control groups. The only aspect in which treatment and control conditions differed from one another was the explicit request to consider the upstream farmers' perspective (i.e. to imagine their thoughts, feelings and expectations before deciding on a donation to the fair). Thus, while the overall level of donations could in principle be affected by an experimenter demand effect, we conclude that the additional effect of the perspective-taking interventions cannot be accounted for by an experimenter demand effect.

Hence, taken together, the main results of the experiment and these additional elements of the discussion indicate that the procedures we employed to induce our perspective-taking prompted prosocial behaviour by activating other-regarding concerns. Specifically, they may have activated (a) concern for the wellbeing of upstream farmers (i.e. empathic concern, sympathy or compassion), (b) concern for the expectations upstream farmers may hold about the behaviour of downstream farmers, (c) concern for (personal or social) norms, or a combination of one or more of these aspects. Systematically disentangling these potential mechanisms is beyond the scope of this paper, but could be an interesting extension for future research.

Our work contributes to the literature by generating evidence that specific procedures aimed at inducing perspective-taking can, in fact, be associated with higher prosocial behaviour. Contrary to other studies, our experimental set up allows us to separate the effect of induced perspective-taking from other possible confounding variables, namely communication, role uncertainty, incentives for strategic interactions and provision of additional information. We could also rule out that the result is due to an experimenter demand effect. Moreover, our study was conducted with non-student subjects in an actual natural resource management setting. Our study thus also contributes to expanding our understanding of the potential and possible policy relevance of inducing perspective-taking to promote prosocial actions in natural resource management. In this line, it adds to previous evidence (qualitative evidence in most cases) suggesting that inducing heterogeneous stakeholders to consider a perspective broader than their own—e.g. through participatory and collaborative approaches—could be beneficial to attaining better collective outcomes in natural resources management (Ostrom and Gardner 1993; Pahl-Wostl and Hare 2004; Gurung et al. 2006; Lejano and Ingram 2009; Lubell and Lippert 2011; Medema et al. 2016).

Two caveats are in order when drawing out general and policy implications from our results. First, although the farmers in our sample share key characteristics with the general

farmer population in the Cañete province, our sample shares with that of other lab-in-the-field experiments that it is not perfectly representative. The low turnout rate indicates that there were farmers we did not manage to recruit because they were not attracted by the activity we carried out and/or by the compensation we offered. Additionally, not all participants answered the post-experiment survey, arguably due to time and/or literacy restraints. As a result, not all observable characteristics were measured for all participants so that part of the regression analysis (i.e. estimation of Model 2 and Model 4) was performed on a smaller subsample (as can be noted in Table 3). Even though our analyses suggest that this does not compromise the internal validity of our results, a natural next step for further research would be to systematically assess the potential of interventions inducing perspective-taking with larger and more representative samples and with experimental designs involving higher stakes. In this way, we could gain more insights regarding the generalisability of our results.

Second, as previous research has well indicated, the effects of inducing perspective-taking are procedure-, situation- and context-specific. The scope of our results is hence restricted to perspective-taking procedures, decision situations and social-ecological and governance contexts which are similar to the ones of our experiment.<sup>12</sup> For example, our setting was characterized by a relatively high level of trust in the implementing organizations.<sup>13</sup> Future research may want to compare the effects—as well as the duration of the effects—while varying the procedures to induce perspective-taking (e.g. using *imagine-other* vs. *imagine-self* perspective-taking instructions), the policy setting (e.g. making donations formally conditional on upstream activities) or the types of resource users (e.g. downstream farmers vs. urban dwellers). This could be done in the same general context of watershed management involving upstream-downstream social and ecological asymmetries to increase comparability and isolate effects. Or it could also be done, in a controlled fashion, in other types of situations and social-

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<sup>12</sup> We use *imagine-other* procedures to induce perspective-taking in an asymmetric, one-shot decision situation where the receivers of the action are less well-off.

<sup>13</sup> In our study, farmers donate to a policy initiative led by a government organisation and by community organisations of upstream farmers. Although downstream farmers are not well-acquainted with the landscape reserve (10.5% of 179 farmers reported they know it), it has a good reputation with those who knew it (they approve of its performance, on average, and 94% of them consider it is an appropriate organisation to co-organise the fair). Moreover, an academic organisation—the university the authors of the paper are affiliated to—was conducting the sessions with farmers and guaranteeing that the farmers' donations would be effectively handed over the people organising the fair. These features define a specific institutional context whose variation may influence the effects of inducing perspective-taking on prosocial behaviour. When interviewed during the post-experiment survey about their willingness to contribute to a PES-like scheme, for example, various farmers revealed they were willing to do so insofar as clear monitoring conditions were established to avoid money donated to the scheme being diverted to unproductive uses upstream or elsewhere in the watershed.

ecological and governance systems to expand our understanding on the ways through which the context might moderate the effects of inducing perspective-taking.

Our results allows us to underscore the potential of directly appealing to other-regarding preferences to promote actions in favour of socially desirable (social-ecological) outcomes (Bowles 2016). Had the participants of our experiment only been concerned with their own material outcomes, they would not have responded to the treatment in the way our results indicate they did; in fact, they would not have responded to the treatment at all. Our results, therefore, not only illustrate the potential of facilitating and inducing perspective-taking in natural resource management to promote pro-social actions. They also highlight the potential for expanding the set of assumptions and complementing the set of environmental policy tools used to address and resolve social dilemmas.

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**Statement of exclusive submission:** This paper has not been submitted elsewhere in identical or similar form.

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## **Appendix A – Experiment procedures and instructions**

### **A1. Procedures**

#### **1. Preparation for a session**

- a. A copy of all instructions and these procedures is printed out and distributed to each experimenter.
- b. A summary of the relevant instructions is placed in each private booth wherein participants will perform their respective tasks during the experiment.
- c. A three-part questionnaire is printed and sorted by participant.
- d. Registration form is prepared.
- e. On the same table:
  - i. White bags labelled “Suyo” (yours, in Spanish) are placed close to sixteen sets of sixteen one-sol coins each, i.e. each participant’s endowment. Each endowment is left out of the bag (see below).
  - ii. Yellow bag labelled “Feria” (fair, in Spanish) and also marked with a code for each participant, i.e. the number of observation. This mark is made within the bag, on the sly, so that no participant can see it without close inspection.
- f. An A4 envelope is also discreetly marked with this same code.
- g. To not mix up questionnaires and bags with different identification numbers, the three parts of the questionnaire, the envelope, the yellow bag, the informed-consent document, and the receipt of the endowment are put together in a clipboard to be handed out to participants as described below.

#### **2. Registration**

- a. As participants arrive to the venue, the Assistant 1 (Experimenter 3) registers participants at the desk in the lobby of the venue.
- b. Experimenter 5 welcomes each participant at the entrance and guides them to Experimenter 4 once they are registered. Experimenter 4 and Assistant 1 (Experimenter 3) are sufficiently separated from one another, in different locations, so that Experimenter 4 does not receive personal information about participants.

#### **3. Handing out surveys, endowment, the informed-consent document, and the receipt.**

- a. Upon each participant’s arrival, Experimenter 4, participant by participant, ...
  - i. ... shortly explains what the meeting participants are attending is about (i.e. a two-hour meeting consisting of an experiment and a three-part questionnaire)
  - ii. ... shows the three-part questionnaire to participants and puts part B and part C of the questionnaire in the A4 envelope. Part A is left out and the A4 envelope sealed up.
  - iii. ... hands out the sixteen-sol endowment to participants
    1. Explains that the endowment is meant to be a compensation for their time, effort, and transportation costs to attend the experiment.
    2. Shows the sixteen-sol endowment to each participant.

3. Puts these sixteen soles in a white bag labelled “Suyo” (Yours, in Spanish)
  4. Puts the white and yellow bags [TB<sup>14</sup>: as well as the blue envelope] in a small envelope.
  5. Seals the envelope and hands it out to participants—“this is for you”.
- iv. ... shows, explains, and hands out the informed-consent document and the receipt for the sixteen soles.
  - v. ... puts these documents together with part A of the questionnaire above the A4 envelope on the clipboard.
  - vi. ... instructs participants that they are to start reading the informed consent and responding to part A of the questionnaire once they have taken their seats.
  - vii. ... tells participants to continue, choose a seat, and sit down.
- b. Experimenter 1—supported by Experimenter 5—takes care of each participant to keep them from talking to each other while the meeting commences.

#### 4. Welcome

- a. Experimenter 1 welcomes all participants and officially starts the activity.
- b. Questions are answered.
- c. Informed consent and receipts are completed and signed.

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#### 5. [TA and TB only: Video]

- a. Participants are told by Experimenter 1 that they will see a video on the Cañete River Watershed.
- b. Participants receive information on which vantage point to watch the video from.
- c. The video is shown.

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#### 6. Introduction to choice task

- a. Participants are told by Experimenter 1 that they will decide on whether or not and, if so, how much money to transfer to upstream farmers participating in the agroecological fair.
- b. Participants are asked to take [Control and TA: the white and yellow bags] [TB: the white and yellow bags, as well as the blue envelopes] out of the small envelope.
- c. They are introduced to the choice task.

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#### 7. [TB only: Introduction to perspective-taking task]

- a. Participants are told by Experimenter 1 that before performing the choice task, they will imagine how much of the sixteen-sol endowment upstream farmers participating in the agroecological fair would like to receive.
- b. Participants are guided, one by one, to the room representing the upper part of the watershed.

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<sup>14</sup> For communication within the research team, this is how the conditions were referred to during the execution of the experiment. Control corresponds to *Control 1 (Info only)*, TA corresponds to *Control 2 (Info + Video)*, TB corresponds to *Treatment (Info + Video + Perspective-taking)*.

- c. They are told to only take the sealed blue envelope with them and leave everything else in their seats before moving to the room.

**8. [TB only: Perspective-taking task]**

- a. Experimenter 3 welcomes each participant and guides them to their private booths.
- b. Once in the room, participants receive the instructions from Experimenter 3 for the perspective-taking task.
- c. The perspective-taking task is performed.
- d. Participants are asked to go back to the room where they were initially welcomed and introduced to the experiment.

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**9. Choice task**

- a. One by one, Experimenter 1 asks participants to grab their white and yellow bags.
- b. Participants are guided to the room representing the lower part of the watershed
- c. Experimenter 2 welcomes each participant and guides them to their private booths.
- d. Once all participants are in the room, participants receive instructions for the choice task.
- e. The choice task is performed.
- f. Participants are asked to go back to the room where they were initially welcomed.

**10. Questionnaire**

- a. A number of participants equal to the number of experimenters and assistants available in the room start responding to part C of the questionnaire—which is applied by experimenters and assistants.
- b. In the meantime, the rest of the participants complete part A of the questionnaire and start responding to part B on their own.
- c. Once the former group of participants has finished with part C of the questionnaire, they move on to completing part A and responding to part B of the questionnaire on their own.
- d. Once the second group of participants is done, they move on to responding to part C of the questionnaire.
- e. Foods and drinks are offered during this part of the meeting.

## A2. Experiment instructions

### A2.1. Welcome to participants<sup>15</sup>

[Participants register upon arrival at the entrance. Assistant 1 or Experimentalist 3 carries out this registration.]

[Upon arrival, Experimentalist 4 provides the following information farmer by farmer. (If everyone has arrived and there is little time to start, the possibility of providing the instructions to everyone at the same time would be considered in order to avoid substantial delays at the beginning of the session<sup>16</sup>)]

Welcome and thank you for your participation. This activity is part of the data collection phase of a study being carried out by the University of Osnabrück, based in Germany, with farmers of the province of Cañete. This study has only academic purposes.

In order to collect the necessary information for the study, today we will firstly conduct a group dynamic exercise and then a survey, which is divided into three parts [**show all three parts of the questionnaire**].

You need to answer these two parts of the survey [**show "Survey - Part A" and "Survey - Part B"**] on your own. One of the members of the research team will help you answer the third part of the survey [**show "Survey - Part C"**]. You can raise your hand at any time to ask for assistance; one of the members of the research team will help you. For now, I am going to put these two parts of the survey [**show "Survey - Part B" and "Survey - Part C"**] in this envelope [**show the envelope**] and seal it [**put Part B and Part C inside the envelope and seal it**]. Please do not open it until you are told to do so. I will put this part of the survey [**show "Survey - Part A"**] aside for you to read and respond before the meeting starts. Please do not talk to any other participants. If there are any questions you don't understand, leave them unanswered. After the group dynamic exercise, we will answer all the questions you may have.

I will also give you this sheet [**provide the informed consent**], which is an informed consent form that summarizes the main aspects of today's meeting. Each participant must read and sign this sheet as a guarantee that their participation in the study is voluntary and informed. While waiting in the meeting room, you may start reading this document. Then, my colleague will explain it to you and resolve any questions you may have about it. She will explain how to fill it out and when to sign it. At the end of the exercise, we will give you a copy of the signed document if you require it for your personal records.

The whole activity lasts between an hour and a half and two hours. We will acknowledge your time, effort and travel costs with these sixteen soles [**count the money in front of the**

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<sup>15</sup> The choice task is referred to as "Ejercicio dinámico" in Spanish. It is then translated as 'group dynamic exercise' in this version of the instructions. Footnotes have been added in this version of the instructions; they were absent in the original (Spanish) version used by the research team.

<sup>16</sup> This was never the case and every farmer followed this procedure

**participant]**. I'm going to put the sixteen soles in this white bag **[insert the coins in the white bag]**.

I will also give you this yellow bag, empty **[Control and TA:] [TB: and this blue envelope, sealed]**. In this Manila envelope I put the two bags **[TB: and the blue envelope]**, and I will seal it **[fill it in and seal the envelope]**. Please do not open it until you are told to do so.

**[As they receive these instructions individually, farmer-by-farmer, farmers are placed in the meeting room. Experimentalist 1, with the support of Experimentalist 5, solves doubts and questions that participants may have before the exercise begins. Important: provide only general information about the project and only provide detailed answers about the informed consent and receipt. Experimentalists should clarify that other details will be explained later].**

**[While they wait, ambient music –typical for the upper and lower regions of the watershed is played]**

**[Once all the participants are placed in the meeting room, Experimentalist 1 provides the following information]**

### **Welcome**

Good afternoon to everyone. Welcome again and thank you for your participation. As explained at the beginning of the exercise, this afternoon we will complete, firstly, a group dynamic exercise and, secondly, a questionnaire. Both are part of the data collection phase of a study from the University of Osnabrück in Germany, related to agriculture in the province of Cañete. Since you are all farmers in this province, your participation is extremely important for the objectives of the project.

### **Introduction and general instructions**

When you entered the room, you received sixteen soles, acknowledging the time, travel expenses and effort that you are investing in this activity. Since it is not actually a talk or a training activity—we are collecting this information for the benefit of the research being conducted by the University of Osnabrück—the university is thus compensating your time and transportation.

The money being provided is not our private money. It is provided to the University of Osnabrück for the implementation of this project by the Alexander von Humboldt Foundation, located in Germany.

All the information collected is anonymous and will be used solely for academic purposes by the university. It will not be given to any public or private organization. During and after the activity, no one will have any way of knowing other participants' choices. In addition, no one will be able to link your identity with your decisions in the group dynamic exercise or your answers to the questionnaires.

Next July<sup>17</sup>, we will return to the Cañete Province to present and discuss results of this research with you.

To participate in the exercise, it is very important that you pay close attention to the instructions that we are about to give you.

- a) The activity lasts between an hour and a half and two hours.
- b) We need your full attention without distractions. Please follow all the instructions provided by my colleagues. Please, try not to use your phone or participate in any other activity that might distract you.
- c) Please do not talk with other participants during the exercise. If you have any questions, raise your hand and one of my colleagues or I will assist you.

We will be conducting the same exercise several times throughout the following days. We request you not to discuss your decisions, answers or details of the exercise with other farmers. This way, they can come and participate under the same conditions that you have.

Up to this point, do you have any questions?

**[Time to solve any questions or doubts]**

Upon entering the room, my colleague handed you a sheet entitled "informed consent." As explained, it contains all the information I have provided. With your signature, this document guarantees that your participation in the exercise is voluntary and informed, and that you have received the money as a donation. It is a standard practice of the university to ensure that the activities carried out follow appropriate ethical principles.

Now, I will read the commitment at the bottom of the sheet; please go to that part and follow along. If you agree, print your name and then sign the sheet. **[Read out loud both parts of the commitment, each participant signs the first part]**

Behind the informed consent document, there is a payment receipt for the sixteen soles that were given to you. This receipt is an invoice for the project's accounting. Please read it and, if you agree with its content, sign it.

**[Time for signature of informed consent and receipts]**

**[Once signed, Experimentalist 1 and Experimentalist 5 collect signed receipts and signed informed consents and retain them in storage]**

**[Control: No video presentation]**

**[TA and TB:** Well, to begin the exercise, we will present a video with information about the ecological characteristics of the Cañete River Watershed and the people who live there. While watching,] **[TA:** please pay close attention to the information presented in the video] **[TB:** imagine what the people who live in the upper region of the Cañete River—near the river's source—think and feel. It is not necessary to pay attention to all the information

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<sup>17</sup> July 2019

presented in the video, just concentrate on the users of the upper watershed, on what you imagine they think and feel in their current situation as described in the video.]

## **A2.2. Instructions**

### **Instructions for the group dynamic exercise (i.e. the choice task and the perspective-taking task)**

**[Control: Once participants have read and signed both the informed consent and the receipt of the sixteen soles, Experimentalist 1 gives the following information]**

**[TA and TB: Once participants have seen the video about the Cañete River Watershed, Experimentalist 1 gives the following information]**

Thank you for your attention. Let's start the group dynamic exercise now.

**[TA and TB: As you saw in the video]** Nor Yauyos Cochas Landscape Reserve is organising an agroecological fair. The aim of the fair is that the communities in the upper region of the Cañete River Watershed can sell their products to new consumers and thus improve the commercialisation of their agricultural products. These communities live close to the headwaters of the Cañete River, in grasslands and *bofedales*. The water supply of the lower regions of the river, i.e. of the Cañete River Valley, depends on the conservation of these natural areas.

The farmers and ranchers who commit to not polluting water and help conserve natural areas such as pastures, *bofedales* and forests are the only ones that can sell their products at the agroecological fair.

Now, you have the possibility to support these communities in the upper watershed in the organisation of this fair. To do so, you may decide if you want to donate to the fair. If so, you may choose how much of the sixteen soles you just received you would like to donate. The amount given by you will be collected by us and delivered directly to the Nor Yauyos Cochas Landscape Reserve and other community leaders who participate in the organization of the fair, who will use the money for the installation and promotion of the fair. The fair is taking place in the coming months.

There is no right or wrong choice, you may choose as you want. Remember, the sixteen soles are entirely yours. Therefore, you may take home the amount you do not give to the fair. Also remember that no one will link your name with the decisions you make; all decisions are anonymous.

To make your decision, carefully follow the instructions we give you: **[display in the whiteboard the slide with the corresponding instructions]**

1. First, open the small Manila envelope—the one you received at the entrance after registering.

2. As you can see, this envelope has the white bag containing your sixteen soles inside [**Control and TA:** and the yellow bag that is empty] [**TB:** the yellow bag that is empty and a closed blue envelope]
3. Only once you are in the basement in your private booth [**or room X; point out the appropriate room to the participants**] and my colleague gives you the signal, put what you want to give to the fair in the yellow bag [**show white and yellow bags while explaining the choice task.**] For now, don't open any of the bags.
4. You will make this decision in the room downstairs [**or room X; point out the appropriate room to the participants**]. The room represents the Cañete River Valley; that is, it represents the lower watershed. Here you can see the representation of the Cañete River, which goes down from the upper watershed and irrigates the entire valley [**point to the blue strip representing the river**]. There is a cubicle for each participant in the room downstairs. The idea is that everyone makes their decision privately and anonymously, without anyone seeing or identifying the decision they made.
5. You will be guided to the cubicle I will indicate for you to go in a moment. Take only the white bag and the yellow bag with you—remember not to open them until you are told.

So far, do you have any questions?

***Start of the instructions for the perspective-taking exercise-----***

6. [**TB:** Before going to your private booth to make your decision, you will imagine how much of your sixteen soles farmers who sell their products at the agroecological fair would like to receive from you.
7. For this, you will take only the blue envelope with you and will go to the second level of the venue [**or room B; point out the corresponding room to the farmers**]. The second level of the venue represents the upper watershed, where the Cañete River rises. Please do not open the envelope until you receive the indication to do so once you are in your private booth. You will receive the corresponding instructions there.
8. Please note that you will only answer how much of your 16 soles you think that the upstream farmers selling their products at the agroecological fair would like to receive. You will write that amount on the card inside the blue envelope. This is not the step in which you make your decision about how much you will give to the fair; this decision will be made later, in the room downstairs.

If you have any questions at any time, please raise your hand; my colleagues or I will help you to resolve them.

So far, do you have any questions?

**(Time for Questions and Answers)**



If there are no (more) questions, each participant will now go to the private booths located on the second level of the venue (**in room B**)

**(One by one, participants go to the room that represents the upper watershed)**

**(In the room representing the upper watershed, Experimentalist 3 welcomes each participant and tells them the following)**

9. This room represents the upper region of the Cañete River Watershed; that is, it represents the area where the Cañete River rises. This is Piticocha Lake [**show**], one of the lakes where the river is born [**point out the plastic blue strip to each participant**].
10. Please sit down in one of the booths [**locate participants from the back of the room out**] and wait without opening the blue envelope until a pen is given to you.
11. In the meantime, carefully read the instructions in the booth. Please remember not to open your blue envelope yet.

**(Experimentalist 3 reads the instructions to everyone once they are in the cubicles.)**

12. Now, open the blue envelope, which contains a card.
13. Imagine how much of your sixteen soles the farmers selling their products in the agroecological fair would like to receive from you.
14. When a pen is given to you, you write that amount in the corresponding blank on the card that is inside the blue envelope. Also on the same card, write the reasons why you imagine that people upstream would like to receive the particular amount you have chosen.
15. Please note that you will not decide how much to give to the agroecological fair here. Just imagine and write down how much of your sixteen soles the producers selling at the agroecological fair would like to receive. Also write down why you think this is the amount they would like to receive.
16. If you have any questions, please raise your hand now. I'll go to your booth and answer them.

**(Time for questions and answers)**

17. Now I am going to give each of you a pen. You have 3 minutes to write the amount and your reasons on the card.

**[After three minutes]**

18. Time is up. Put the card inside the envelope, close the envelope and leave it in the booth cubicle.

19. When told, each of you will return to your seat downstairs. While you wait, please keep quiet.

**[One by one, participants go to the seat where they received the instructions, take their yellow and white bags, and move towards the room that represents the lower watershed. Experimentalist 1 verifies they only take the yellow and the white bags and guides them to the corresponding room. Experimentalist 2 welcomes them in this other room, places them in the corresponding cubicle, and reminds them not to make their decision until they are told; that is, they are reminded not to open either the white or the yellow bag before they are instructed to].**

*End of instructions for the perspective-taking exercise-----*

**[Control and TA: Experimentalist 1 guides each participant to their private booths. Experimentalist 2 welcomes them and places them in a booth working from the back of the room up to the front of the room.**

**[Control, TA and TB: As soon as all participants are in their booths, the Experimentalist 2 reads the instructions out loud]**

20. In a moment I will read the instructions of the exercise, please pay attention.
21. Only when instructed (*raise voice to be clear*) you shall decide whether to donate to the agroecological fair and if so, how much of your sixteen soles you wish to donate, placing your donation in the yellow bag. You will have 3 minutes to make your choice and your possible donation. After those 3 minutes leave the yellow bag for the fair on the table, in the booth. You will keep the amount you do not donate to the fair in your white bag and will take it with you. Then I will tell you, one by one, in order, to return to your initial seats.
22. If you have any questions, please raise your hand. I'll come to the booth and answer them

**[Time for Questions and Answers]**

23. If there are no (more) questions, you can make your decision now.

**[After 3 minutes]**

24. Close the yellow bags, leave them in the booth and do not reopen them.
25. I will tell you, one by one, when you may go back to your seats upstairs to answer the survey. In the meantime, wait in silence in your booths.

**[One by one they go to the seats where they received the general instructions to answer the survey]**

### A3. Organisation of rooms in the venue for the experiment

<b>Room for general instructions and survey</b>	
<p>Way to second level of the venue (Upper watershed)</p>	<p>Way to basement (Lower watershed)</p>
<b>Basement - Lower watershed</b>	<b>Basement - Lower watershed (Private booth)</b>
<b>Second level of the venue - Upper watershed</b>	<b>Second level of the venue - Upper watershed (Private booth)</b>

#### A4. List of additional supplementary materials<sup>18</sup>

Materials	Language	
	English	Spanish
Slides supporting the presentation of the instructions to participants	X	X
Instructions pinned to cubicles	X	X
Form for perspective-taking task	X	X
Three-part survey		X

### Appendix B – Sampling and plan of sessions

#### B1. Sampling

Commissioners of each of the seven water irrigation canals provided general information regarding (a) the sectors comprising each canal, (b) their location (i.e. the townships each sector comprises) and (c) the number of water irrigators (i.e. downstream farmers) located throughout the canals in these different sectors and townships. Upon this information, we visited downstream farmers at their plots or homes inviting them to participate in a research activity on agriculture in the Cañete Valley organised by Osnabrueck University. Specifically, they were invited to attend a two-hour meeting consisting of a task/exercise/group dynamic exercise (“Ejercicio dinámico” originally in Spanish)<sup>19</sup> and a survey on their socioeconomic characteristics and perceptions about agriculture in the region. Leaders of the irrigation commissions and board of irrigators and also water operators from each irrigation commission provided help introducing members of the research team to the sectors and farmers of each irrigation canal.

In the same week, we targeted downstream farmers from the head, tail and middle canal sections of a given set of irrigation canals. Preferably early in the mornings (while they were usually working at their plots) and sometimes in the afternoons (while they were at home), members of the research team headed to a particular township and invited and registered all farmers we met. Considering that not all farmers were working (or available at home) the same days at the same time, we often sought to visit a particular township and its surrounding areas at least twice. As one irrigation canal gradually became completely visited (i.e. we did not meet additional farmers to invite), another canal was visited until all seven canals had eventually been covered.

When visited, farmers were...:

1. ... introduced to the project and invited to attend an activity to collect data—this included informing them about the PEN S/16 reimbursement they would receive for their participation in the experiment. This sum served to acknowledge their effort, time and transportation costs accrued to attend the activity;

<sup>18</sup> Available upon request.

<sup>19</sup> The phrases economic experiment or economic game were not used in either the participant recruitment phase or during the experiment sessions. Instead, the rather neutral noun phrase ‘group dynamic exercise’ (“Ejercicio dinámico” in Spanish) was preferred and used.

2. ...asked about some personal basic information, i.e. first name, last name, age, district, cell phone number, the name of the closest town to their plots, the size of their plots, and the products they harvest;
3. ... scheduled for a particular (experimental) session—or, alternatively, some of them were registered to be called and scheduled for a session later on.

On a daily basis, we followed up on farmers' (to-be-confirmed and confirmed) appointments by phone.

## **B2. Plan of sessions**

Our goal was to obtain data from as many farmers as possible given the available time and budget. During the invitation and registration of farmers, as well as during the follow-up phone calls with registered farmers, we targeted farmers from all administrative districts, all irrigation canals and from the different parts of each canal (i.e. head, tail and middle canal sections) in the Cañete Valley. For their constituting the majority of farmers in the valley, we primarily targeted small- and medium-scale farmers.

The assignation to treatment and control conditions was at the session level, the main reason for this being that the setup of the experiment in the venue made it logistically unfeasible to randomly assign participants to treatment and control conditions within the same session (see Appendix A2). All sessions were scheduled in the afternoon (after farmers' working day) and, aside from the sessions carried out during the first week, all sessions were held at the same time slots (see details in the legend of Table B1).

All sessions were initially randomly assigned to treatment and control conditions. When sessions got cancelled (e.g. because no farmer showed up in a scheduled and confirmed session), assignation of remaining sessions to treatment and control conditions was (quasi-randomly) adjusted based on two aims: (a) to attain a balanced assignation of sessions over the schedule (in terms of days and time slots), and (b) to ensure a higher number of participants in the treatment condition, where we expected to observe a higher variance in the outcome variable (List, Sadoff, and Wagner 2011; Moffat 2016). Both the initial plan of sessions and the subsequent adjustments were defined before knowing the specific characteristics of farmers attending a particular experimental session.

Because of these features of the assignation-to-treatment procedures, sample sizes are not balanced across treatment and control conditions. The distribution of farmers' characteristics, however, is fairly balanced across treatment and control conditions as can be noted in Table C1, below. We control for these characteristics in our regression models (see Appendix C, section C2) as part of our initial research plan. Our results are not affected when controlling for farmers individual socioeconomic characteristics. All this is evidence which indicates that our assignation to treatment procedures were seemingly successful in getting farmers assigned to treatment and control conditions independently of their characteristics, thereby avoiding a potential selection bias compromising the identification of treatment effects.

**Table B1 – Plan of sessions and number of participants by session**

Week (2018)	Slot	Mon.		Tue.		Wed.		Thu.		Fri.		Sat.		Sun.	
		Treat.	N	Treat.	N	Treat.	N	Treat.	N	Treat.	N	Treat.	N	Treat.	N
21-01	S1	x		C1	8	C2	2	C2	3	x		T	7	x	
	S2	x		C2	3	T*	3	x		x		x		x	
28-01	S1	C2	2	C2	4	T	2	x		C1	7	C1	2	C1	7
	S2	C2	2	C2	5	T	2	C2	10	T	8	C2	5	x	
04-02	S1	x		C2	4	C1	2	x		x		C1	4	C2	6
	S2	T	7	x		T	3	T	6	C1	7	T	13	C1	9
11-02	S1	T	2	T	3	x		x		C2	5	x		T	3
	S2	C1	2	T	2	x		C2	2	T	8	T	5	T	5

**Notes:** Date of Monday of each week is displayed. **S1** stands for the first time slot and **S2** for the second slot. In the first week, 16:00 and 18:00 were, respectively, the starting times of each slot. In the second, third and fourth week, 15:00 and 17:00 were, respectively, the starting times of each slot. **C1** stands for Control 1 (*Info only*), **C2** for Control 2 (*Info + Video*) and **T** for Treatment (*Info + Video + Perspective-taking*). An ‘x’ marks the planned sessions that we had to cancel in the end. In total, 182 farmers showed up to the experiment sessions. Of these, two farmers left the venue without leaving any of the bags of the choice task in their assigned booths.

\*Data from the fourth session (N=3) is left out due to a mistake in the implementation of the procedures.

**Table B2 – Number of participants and sessions, by condition**

<i>Condition</i>	<i>N.° participants</i>	<i>N.° sessions</i>	<i>Avg. N.° Participants per session</i>
Control 1 <i>Info only</i>	48	9	5
Control 2 <i>Info + Video</i>	53	12	4
Treatment <i>Info + Video + Perspective-taking</i>	79	15	5
<b>Total</b>	<b>180*</b>	<b>36</b>	

**Notes:** \*182 farmers showed up to the experimental sessions. Of these, two farmers left the venue without leaving any of the bags of the choice task in their booths and data from the fourth session (N = 3) is left out from the analysis due to a mistake in the implementation of the procedures.

## Appendix C – Statistical appendix

In this Appendix we present, by condition, the summary statistics of the variables we control for in the regression analysis we perform. We also discuss the possible endogeneity of two variables included in the regression analysis: perceived social distance and perceived income distance.

## C1. Summary statistics of control variables

<b>Table C1 – Summary statistics of control variables, by condition</b>				
<b>Variable</b>	<b>Condition</b>			<b>Total</b>
	<b>Control 1</b>	<b>Control 2</b>	<b>Treatment</b>	
	<i>Info only</i>	<i>Info + Video</i>	<i>Info + Video + Perspective-taking</i>	
	<b>Mean</b> (SD) N	<b>Mean</b> (SD) N	<b>Mean</b> (SD) N	
<b>Age</b>	<b>55.61</b> (12.67) 49	<b>55.83</b> (13.86) 53	<b>54.48</b> (13.21) 75	<b>55.20</b> (13.20) 177
<b>Female</b> (1 = Female, 0 = Male)	<b>0.18</b> 49	<b>0.26</b> 53	<b>0.23</b> 75	<b>0.23</b> 177
<b>Education level</b> 10 ordered categories, from lowest to highest	<b>5.43</b> (2.05) 49	<b>5.21</b> (2.05) 52	<b>5.25</b> (1.98) 75	<b>5.29</b> (2.01) 176
<b>Head of household</b> (1 = yes, 0 = no)	<b>0.74</b> 47	<b>0.75</b> 48	<b>0.90</b> 72	<b>0.81</b> 167
<b>Transportation costs</b> From and to the venue; any positive amount in PEN	<b>7.80</b> (5.04) 48	<b>7.83</b> (5.17) 52	<b>8.76</b> (8.50) 74	<b>8.22</b> (6.74) 174
<b>Daily income</b> 1-6 scale, by ranges of income	<b>3.26</b> (1.24) 47	<b>2.98</b> (1.12) 51	<b>3.01</b> (1.04) 74	<b>3.07</b> (1.72) 175
<b>Manager of the plot</b> (1 = yes, 0 = no)	<b>0.90</b> 49	<b>0.91</b> 53	<b>0.95</b> 75	<b>0.92</b> 177
<b>Owner of the plot</b> (1 = yes, 0 = no)	<b>0.73</b> 44	<b>0.64</b> 50	<b>0.55</b> 73	<b>0.62</b> 167
<b>Irrigation canal the downstream farmer belongs to</b>				
<b>Huanca</b> (1 = yes, 0 = no)	<b>0.02</b> 46	<b>0.06</b> 48	<b>0.07</b> 74	<b>0.05</b> 168
<b>María Angola</b> (1 = yes, 0 = no)	<b>0.09</b> 46	<b>0.34</b> 47	<b>0.04</b> 74	<b>0.14</b> 167
<b>Pachacamilla</b> (1 = yes, 0 = no)	<b>0.07</b> 46	<b>0.09</b> 46	<b>0.03</b> 74	<b>0.05</b> 166

<b>Palo Herbay</b> (1 = <i>yes</i> , 0 = <i>no</i> )	<b>0.00</b> 46	<b>0.13</b> 46	<b>0.14</b> 74	<b>0.10</b> 166
<b>San Miguel</b> (1 = <i>yes</i> , 0 = <i>no</i> )	<b>0.20</b> 46	<b>0.23</b> 48	<b>0.19</b> 74	<b>0.20</b> 168
<b>Viejo Imperial</b> (1 = <i>yes</i> , 0 = <i>no</i> )	<b>0.35</b> 46	<b>0.20</b> 45	<b>0.17</b> 75	<b>0.23</b> 166
<b>Nuevo Imperial</b> (1 = <i>yes</i> , 0 = <i>no</i> )	<b>0.28</b> 46	<b>0.17</b> 47	<b>0.39</b> 75	<b>0.30</b> 168

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**Way of finding out about the experiment**

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<b>By research team</b> (1 = <i>yes</i> , 0 = <i>no</i> )	<b>0.78</b> 49	<b>0.75</b> 51	<b>0.80</b> 75	<b>0.78</b> 175
<b>By a friend</b> (1 = <i>yes</i> , 0 = <i>no</i> )	<b>0.08</b> 49	<b>0.06</b> 51	<b>0.07</b> 75	<b>0.07</b> 175
<b>By a relative</b> (1 = <i>yes</i> , 0 = <i>no</i> )	<b>0.12</b> 49	<b>0.12</b> 51	<b>0.05</b> 75	<b>0.09</b> 175
<b>By other</b> (1 = <i>yes</i> , 0 = <i>no</i> )	<b>0.02</b> 49	<b>0.08</b> 51	<b>0.08</b> 75	<b>0.06</b> 175

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**Measures on perceived distance (closeness thereof) regarding upstream farmers**

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<b>'Other in the Self Scale' score</b> (1 = <i>distant</i> , 7 = <i>Close</i> )	<b>3.15</b> (2.01) 48	<b>3.58</b> (2.07) 52	<b>3.57</b> (2.02) 72	<b>3.45</b> (2.03) 172
<b>Distance on income</b> Distance on income measurement which measures the relative distance on the position downstream farmers place themselves and upstream farmers in an income scale ( <i>Min</i> = -5; <i>Max</i> = 0.9)	<b>0.26</b> (0.54) 48	<b>0.22</b> (0.91) 53	<b>0.29</b> (0.72) 75	<b>0.26</b> (0.74) 176
<b>Been up in the upper part of the watershed before</b> (1 = <i>yes</i> , 0 = <i>no</i> )	<b>0.59</b> 49	<b>0.55</b> 53	<b>0.41</b> 75	<b>0.50</b> 177

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**Notes:** SD is the standard deviation and N the number of non-missing observations

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## C2. Complete results of regression analysis

**Table C2 – Results of Tobit estimations**

Variables	Outcome variable: amount donated to the agroecological fair			
	(1)	(2)	(3)	(4)
<b>Perspective-taking</b>	<b>3.224***</b> [1.335, 5.112]	<b>4.841***</b> [2.341, 7.341]	<b>2.781***</b> [0.707, 4.856]	<b>3.095**</b> [0.287, 5.903]
<b>Video</b>			<b>0.417</b> [-1.295, 2.128]	<b>0.891</b> [-1.803, 3.585]
<i>Age</i>		<b>-0.0136</b> [-0.107, 0.0794]		<b>-0.00826</b> [-0.0983, 0.0818]
<i>Female</i>		<b>-2.787*</b> [-5.923, 0.349]		<b>-2.763**</b> [-4.918, -0.608]
<i>Education level</i>		<b>-0.431</b> [-1.142, 0.280]		<b>-0.0219</b> [-0.661, 0.617]
<i>Head of household</i>		<b>-1.539</b> [-4.328, 1.250]		<b>-2.112*</b> [-4.469, 0.244]
<i>Transportation costs</i>		<b>-0.254**</b> [-0.462, -0.0456]		<b>-0.165*</b> [-0.354, 0.0235]
<i>Daily income</i>		<b>-0.704</b> [-1.893, 0.484]		<b>-1.049**</b> [-2.024, -0.0736]
<i>Manager of the plot</i>		<b>14.09***</b> [6.132, 22.04]		<b>4.953*</b> [-0.783, 10.69]
<i>Owner of the plot</i>		<b>1.594</b> [-0.799, 3.987]		<b>0.588</b> [-1.568, 2.744]
<i>Huanca</i>		<b>-1.773</b> [-8.635, 5.090]		<b>-2.924</b> [-9.556, 3.708]
<i>María Angola</i>		<b>3.863</b> [-3.936, 11.66]		<b>-0.714</b> [-4.523, 3.096]
<i>Pachacamilla</i>		<b>1.528</b> [-3.501, 6.556]		<b>1.436</b> [-2.537, 5.408]
<i>Palo Herbay</i>		<b>-0.795</b> [-6.628, 5.038]		<b>-0.562</b> [-5.146, 4.022]
<i>San Miguel</i>		<b>-2.988**</b> [-5.654, -0.322]		<b>-2.295*</b> [-4.738, 0.149]
<i>Viejo Imperial</i>		<b>-1.515</b> [-4.479, 1.449]		<b>-2.292*</b> [-4.924, 0.339]
<i>By research team</i>		<b>5.166**</b> [1.219, 9.112]		<b>0.737</b> [-3.625, 5.099]
<i>By a friend</i>		<b>6.312**</b> [1.327, 11.30]		<b>3.697</b> [-1.746, 9.141]
<i>By a relative</i>		<b>10.05***</b> [4.162, 15.94]		<b>2.290</b> [-3.236, 7.815]
<i>Been to the upper watershed before</i>		<b>0.169</b> [-2.223, 2.561]		<b>-0.0583</b> [-2.205, 2.088]
<i>High distance on income</i>		<b>-0.403</b> [-2.719, 1.912]		<b>-0.420</b> [-2.361, 1.520]

		<b>0.335</b>		<b>0.809</b>
	<i>High closeness (IOS)</i>		[-1.777, 2.446]	[-1.241, 2.858]
	<i>Constant</i>	<b>5.802***</b>	<b>-5.234</b>	<b>5.803***</b>
		[4.806, 6.799]	[-17.08, 6.609]	[4.815, 6.609]
				<b>7.689*</b>
				[-1.309, 16.69]
No. of observations		124	100	177
Pseudo R2		0.01	0.07	0.01
				0.04

**Tobit** models were estimated assuming lower and upper censoring and calculating robust standard errors. **Perspective-taking** indicates whether or not downstream farmers were induced to perspective-taking. **Video** indicates whether or not downstream farmers watched the video of the watershed.

Confidence intervals (95%) in squared brackets. Robust standard errors were calculated

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table C3 – Results with OLS estimations**

Variables	Outcome variable: amount donated to the agroecological fair			
	(1)	(2)	(3)	(4)
<b>Perspective-taking</b>	<b>2.664***</b>	<b>3.871***</b>	<b>2.310***</b>	<b>2.399**</b>
	[1.153, 4.175 ]	[1.889, 5.854]	[0.630, 3.990]	[0.0271, 4.771]
<b>Video</b>			<b>0.353</b>	<b>0.738</b>
			[-1.136, 1.843]	[-1.653, 3.129]
<i>Age</i>		<b>-0.0117</b>		<b>-0.00372</b>
		[-0.0949, 0.0714]		[-0.0817, 0.0743]
<i>Female</i>		<b>-2.132</b>		<b>-2.218**</b>
		[-4.942, 0.679]		[-4.148, -0.287]
<i>Education level</i>		<b>-0.370</b>		<b>-0.0323</b>
		[-1.025, 0.285]		[-0.604, 0.539]
<i>Head of household</i>		<b>-1.151</b>		<b>-1.709*</b>
		[-3.531, 1.228]		[-3.702, 0.284]
<i>Transportation costs</i>		<b>-0.205**</b>		<b>-0.125</b>
		[-0.382, -0.0274]		[-0.288, 0.0372]
<i>Daily income</i>		<b>-0.553</b>		<b>-0.821**</b>
		[-1.570, 0.464]		[-1.631, -0.0107]
<i>Manager of the plot</i>		<b>11.76***</b>		<b>4.423</b>
		[5.830, 17.69]		[-1.134, 9.979]
<i>Owner of the plot</i>		<b>1.408</b>		<b>0.517</b>
		[-0.680, 3.496]		[-1.362, 2.396]
<i>Huanca</i>		<b>-1.230</b>		<b>-2.222</b>
		[-7.098, 4.637]		[-7.638, 3.194]
<i>María Angola</i>		<b>2.544</b>		<b>-0.765</b>
		[-3.232, 8.320]		[-4.064, 2.534]
<i>Pachacamilla</i>		<b>1.109</b>		<b>1.054</b>
		[-2.790, 5.008]		[-2.271, 4.379]
<i>Palo Herbay</i>		<b>-0.668</b>		<b>-0.530</b>
		[-5.696, 4.360]		[-4.489, 3.428]
<i>San Miguel</i>		<b>-2.710**</b>		<b>-2.146*</b>
		[-5.095, -0.325]		[-4.307, 0.0147]
<i>Viejo Imperial</i>		<b>-1.182</b>		<b>-1.943*</b>
		[-3.732, 1.368]		[-4.165, 0.278]

<i>By research team</i>		<b>3.963**</b> [0.847, 7.080]		<b>0.556</b> [-3.199, 4.311]
<i>By a friend</i>		<b>4.905**</b> [0.713, 9.098]		<b>2.891</b> [-1.763, 7.546]
<i>By a relative</i>		<b>8.100***</b> [3.259, 12.94]		<b>1.640</b> [-3.263, 6.544]
<i>Been to the upper watershed before</i>		<b>0.185</b> [-1.921, 2.291]		<b>-0.0257</b> [-1.892, 1.841]
<i>High distance on income</i>		<b>-0.374</b> [-2.442, 1.693]		<b>-0.301</b> [-1.999, 1.398]
<i>High closeness (IOS)</i>		<b>0.110</b> [-1.786, 2.005]		<b>0.492</b> [-1.301, 2.286]
<i>Constant</i>	<b>5.816***</b> [4.901, 6.732]	<b>-3.105</b> [-12.82, 6.611]	<b>5.816***</b> [4.903, 6.730]	<b>6.987*</b> [-1.215, 15.19]
Observations	124	100	177	136
R-squared	0.08	0.32	0.07	0.21
Adjusted R-squared	0.08	0.15	0.07	0.07

Confidence intervals in squared brackets (95%). Standard robust errors were calculated.  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### C3. Diagnostics of multicollinearity

Results in Table C4 and Table C5 indicate that multicollinearity is not a critical problem in the regression models estimated with OLS wherein the measured observable variables are included. In both models, the variance inflation factor is lower than 5, being 5 or 10 the commonly used rule of thumb cut-offs to indicate whether multicollinearity might be a problem.

**Table C4 – Variance inflation factors: diagnostics for model (2), Table 3 in the main text**

Variable	VIF	1/VIF
By research team	3.94	0.25
By a friend	2.93	0.34
By a relative	2.54	0.39
Age	1.82	0.55
María Angola (Irrigation canal)	1.72	0.58
Education level	1.65	0.61
Owner	1.56	0.64

Female	1.53	0.65
Video and perspective-taking	1.51	0.66
San Miguel (Irrigation canal)	1.5	0.67
Viejo Imperial (Irrigation canal)	1.47	0.68
Manager	1.36	0.74
Daily income	1.35	0.74
Head of household	1.35	0.74
Palo Herbay (Irrigation canal)	1.34	0.74
Pachacamilla (Irrigation canal)	1.3	0.77
High closeness (IOS)	1.3	0.77
Huanca (Irrigation canal)	1.29	0.77
Been to the upper watershed before	1.28	0.78
Transportation costs to (from) the venue of the experimental sessions)	1.25	0.80
High distance on income	1.23	0.81
<b>Mean VIF</b>	<b>1.68</b>	

**Table C5 – Variance inflation factors: diagnostics for model (4), Table 3 in the main text**

<b>Variable</b>	<b>VIF</b>	<b>1/VIF</b>
By research team	3.33	0.30
By a relative	2.44	0.41
By a friend	2.26	0.44
Video and perspective-taking	2.09	0.48

Age	1.99	0.50
Video	1.95	0.51
María Angola (Irrigation canal)	1.76	0.57
Education level	1.61	0.62
San Miguel (Irrigation canal)	1.6	0.62
Owner	1.58	0.63
Viejo Imperial (Irrigation canal)	1.47	0.68
female	1.42	0.70
Palo Herbay (Irrigation canal)	1.37	0.73
Daily income	1.31	0.76
Pachacamilla (Irrigation canal)	1.31	0.76
Been to the upper watershed before	1.3	0.77
Head of household	1.26	0.79
High closeness (IOS)	1.24	0.81
Huanca (Irrigation canal)	1.2	0.84
Manager	1.17	0.86
Transportation costs to (from) the venue of the experimental sessions)	1.16	0.86
High distance on income	1.11	0.90
<b>Mean VIF</b>	<b>1.63</b>	

### C3.1. On the possible endogeneity of and multicollinearity between the variables measuring distance

Since they were measured after the experiment was conducted, it is possible that the values of the variables measuring perceived distance are influenced by the treatment conditions. To assess whether this is the case, we run pairwise comparisons between the variables that measure this perceived distance and the treatment variables. We also check for significant association between these variables measuring perceived distance and whether participants had previously been in the upper watershed. No statistical association between these variables seem to exist (see results of these tests in Table B2).

<b>Comparison</b>	<i>Pearson <math>\chi^2</math></i>	<i>Fisher's exact</i>	<i>N</i>
High closeness, IOS vs Condition	3.1 <i>P</i> = 0.21	0.23	175
High distance on income vs Condition	1.08 <i>P</i> = 0.58	0.58	179
High closeness, IOS vs Been upstream	3.12 <i>P</i> = 0.08	0.09	176
High distance on income vs Been upstream	1.47 <i>P</i> = 0.24	0.24	180
High closeness, IOS vs High distance on income	0.01 <i>P</i> = 0.923	1.00	175

*Perceived social distance* was measured using the ‘Inclusion of the Other in the Self’ scale (Gächter Starmer and Tufano 2015). Through median split a dummy variable was created out of this variable, generating the ‘**High closeness, IOS**’ variable. To measure perceived distance on income, farmers locate both the average farmer in the upper watershed and the average farmer in the lower watershed on a scale from 1-10 according to their income. The relative distance between the values of these two rankings is what *Perceived socioeconomic distance* measures. Through median split, a dummy variable was created out of this variable, generating the ‘**High distance on income**’ variable. **Condition** indexes the control or treatment condition to which the respective downstream farmer was assigned. ‘**Been upstream**’ stands for ‘Been to the upper watershed before’.